

THE IRON AGE

New York, February 7, 1918



Achievement

BRIDGEPORT Brass parts are thoroughly representative in their field.

From the smallest, simplest piece to the most intricate and complicated part—they represent the highest degree of accuracy, uniformity, appearance and durability.

Years of specialized, intensive study along definite lines has enabled us to attain our present reputation.

Although we have reduced production costs on parts like these from 300 to 500%—we have succeeded in *maintaining* quality up to the BRIDGEPORT Standard.

Bridgeport
BRASS
CO
Bridgeport Conn. U.S.A.

TABLE OF CONTENTS - - - 397

Buyers' Index Section.....450
Wanted Section.....426

Contract Work Section.....436
Help and Situations Wanted.....431
Business Opportunities428

ADVERTISING INDEX - - - 469

Clearing House Section.....380
Professional Notices435

"Shall We Burn the Toluol or Shall We Shoot It?"

¶ Shall we throw away the ammonia, or shall we make it produce crops and other war supplies?

¶ Shall we pollute the air with tar and gas, or shall we make them produce war materials?

¶ Shall we waste our coal supply, or shall we conserve it?

A Koppers By-product Coke Plant will produce the maximum yield of coke and will recover from the coal the tar, ammonia, gas and toluol that is wasted in beehive coking and in burning raw coal.

H. KOPPERS COMPANY

PITTSBURGH, PENNSYLVANIA

Builders of BY-PRODUCT COKE PLANTS

THE IRON AGE

New York, February 7, 1918

ESTABLISHED 1855

VOL. 101: No. 6

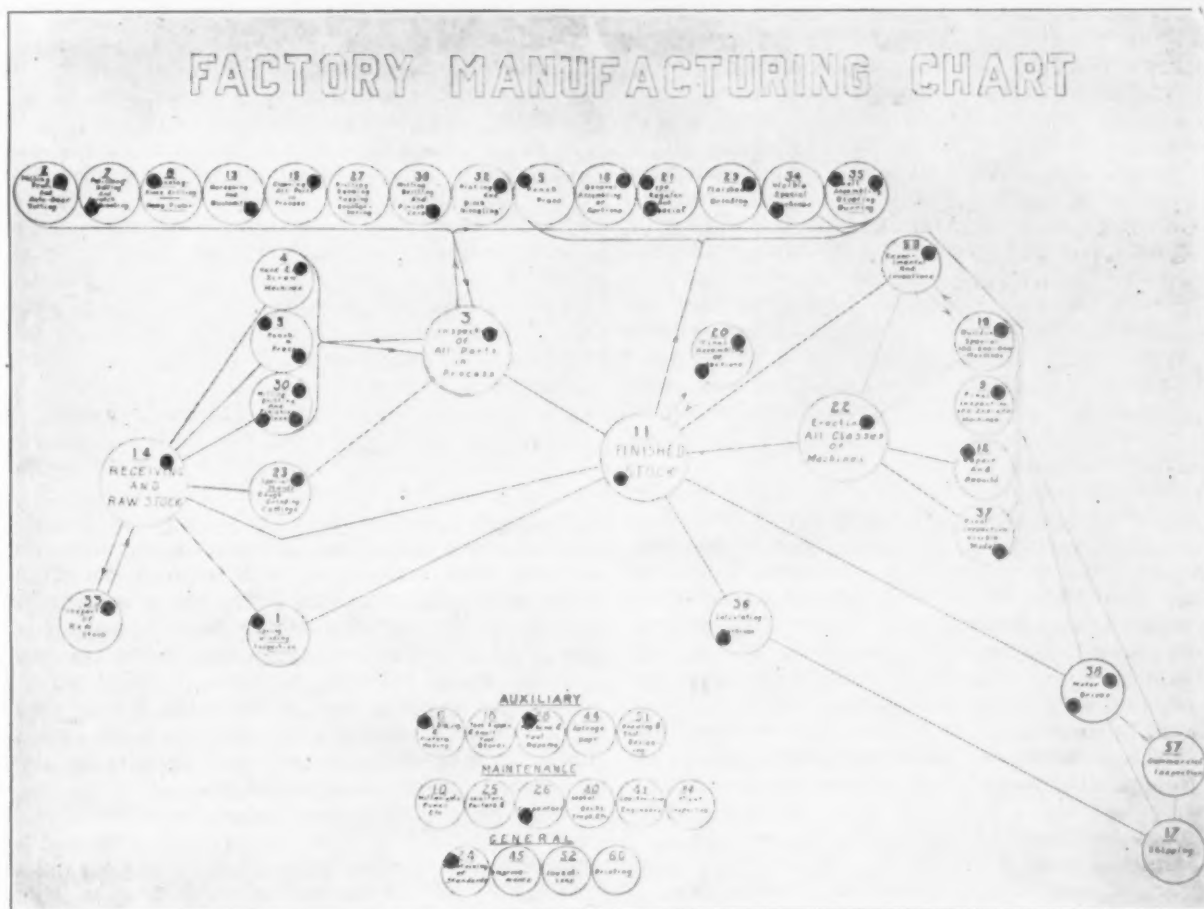
Developing the Community Interest

Family Spirit Fostered by the Burroughs Adding Machine Co. with Gymnasium, Swimming Pool, Entertainments and Other Activities

THEY call the members of their organization "The Burroughs Family" at the plant of the Burroughs Adding Machine Co., Detroit, and that appellation, which includes a factory organization that extends down from the president to the latest addition to the force of office boys, gives an inkling of the various shop activities outside of the usual routine of production that bind together the employees of a great industrial plant in the heart of a big city. The spirit pervades the plant the same to-day with a total force of nearly 5000 people as it did when the factory was small with a handful of workmen and everybody knew everybody else.

The development of a community interest among the employees has been brought about by the co-

operation of the management in various social, educational, recreational and athletic activities that tend to form a bond of interest and friendship between employees which is likely to be lacking when the only thing that employees have in common is that they work in the same shop or on adjoining machines. The company's part in these activities is not the doing of things for employees as is customary in many plants engaged in welfare work, but in encouraging the employees to take the initiative and to do things themselves. The management furnishes the facilities, but the employees themselves must so conduct the various activities that they are self-sustaining, or in other words they must bear the total cost. All organizations for both relief and recreation are under the supervision of



Pins Stuck in the Circles Show Conditions in Each Department, These Having Heads of Different Colors to Indicate Whether the Department Is Short of Help, Short of Equipment, Not Getting Stock on Schedule or Not Getting Work Out on Schedule

the company's Welfare Board which follows certain general theories and rules in carrying out its work, making it co-operative rather than philanthropic work. Some of the most important of the axioms of the Welfare Board are the following:

Any working plan to be effective must have as a basis the conservation of those things most valued by the employee.

The plans are all dependent on the fact that workmen by helping us help themselves.

More real enjoyment comes from the things to which one must contribute personally than from things which are given on a philanthropic plan.

What is generally classed as welfare work is in charge of a committee of five, consisting of a chairman who also has charge of the First Aid Department, a factory supervisor, a girl representing the general office, the office manager and the employment manager. As welfare work is generally considered the giving of something for nothing, the committee prefers to have its department called the Relief and Recreation Department. This committee meets once a week and takes up various matters affecting the welfare of the employees. If a workman is in bad straits financially because of sickness or other unavoidable causes, his case is investigated and should he be found entitled to assistance his rent or grocery bills are paid by the company, and the amount advanced is deducted from his wages in installments. When a man is greatly in need, cash donations are sometimes made to tide him over.

All shop organizations and activities in the plant in the way of entertainments are to a certain extent under the direction of the committee, as these must be conducted according to the regulations prepared by the committee. In the case of entertainments and other activities, for which charges are made, the committee requires the submission of a statement of receipts and expenditures so that it sees that the funds are properly handled and no one makes a personal gain from the undertaking.

The social and athletic activities of the plant are not limited to employees, but are participated in by wives and children of members of the organization. Going further in this direction than most industrial companies a completely equipped gymnasium and swimming pool are provided in the plant. The gymnasium room also serves as a club room and place for holding entertainments, dances, parties and various meetings, being provided with seats that are removed when not needed. The gymnasium is 84 ft. long and 49 ft. wide, and is provided with the usual gymnasium equipment. The swimming pool occupies an adjoining room, and the pool itself is 15 x 32 ft. Several shower outfits are installed in connection with the pool.

Facilities are provided for nearly all the popular indoor and outdoor sports, and great interest is aroused in interfactory contests. There is an interfactory bowling league with six teams, a bowling team that plays in the City League, interfactory baseball teams, handball and basket ball leagues. Four tennis courts are provided on the factory grounds. In the gymnasium swimming classes are conducted under competent instructors for girls employed in the offices and factory, and for wives and children of members. Children of employees, in addition to being taught how to swim, are given calisthenic exercises. There is a young men's gymnasium club open to all in the Burroughs Family.

Getting away from sports and athletics, there is a Y. W. C. A. club composed of girl employees. A branch of the Detroit Public Library is maintained, being open on Tuesdays and Fridays, when books are delivered and orders are taken for books to be

brought the next library day. A training course for boys from 16 to 21 years of age is conducted, the boys being given a two-years' training in the production department and two years in the drafting and tool rooms. These boys spend one-half a day a week in attendance at a technical school in the city and are paid for the time they spend at this school. There are usually about 24 boys taking this training course.

The company carries for its employees group insurance with a company that specializes on insurance policies of this character. After one year of continuous service, an employee is eligible to protection under the insurance plan. This payment is made to the beneficiary in case of death due to an accident or natural causes, and if an employee is incapacitated by injury or accident he is paid his full salary for a minimum of 20 weeks, if he is kept from work for that length of time. This payment is gradually extended with length of service until it reaches a maximum of 40 weeks. In addition to these benefits, the employees come under the protection of the State Compensation Law and also have a Relief Association that was founded by the employees in 1903. This association pays \$5 or \$9 a week to employees in case of illness and a \$50 death benefit.

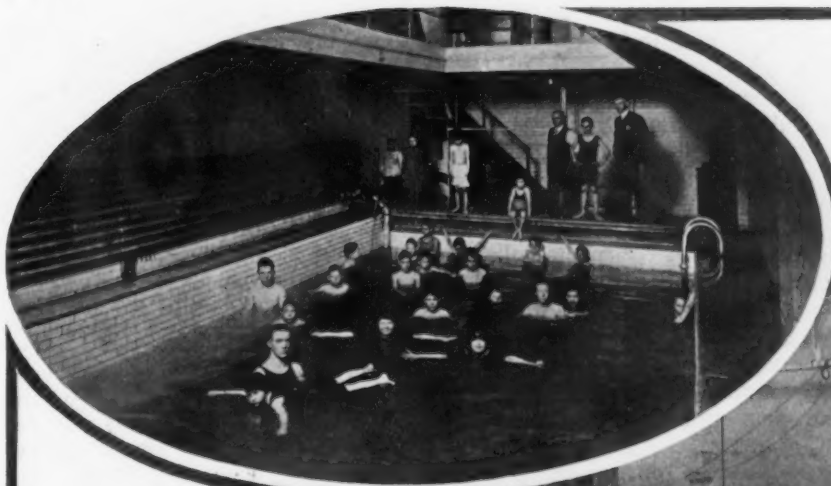
A savings plan under which portions of the employees' wages are deducted by the company and placed in a bank has been in force for some time, but little is being done with this at present as the employees are putting a great deal of their savings in Liberty Loan bonds.

A new hospital is now being fitted up with 900 sq. ft. of floor space, which will include a waiting and rest room for women, a waiting room for men, an eye testing room, a general First Aid room and an operating room, all partitioned off. Several conveniently equipped rest rooms for women are maintained in the plant.

Over the entrance to the building is a service flag on which is inscribed the number "459" formed of stars indicating that this number of members of the organization have joined the colors. About 350 of these were from the factory and home office. Men enlisted or drafted are given leaves of absence and, provided they keep in touch with the company by correspondence, they are to be taken back at the expiration of their service in behalf of their country.

A large addition was recently built to the plant and the greater part of the top floor of this is occupied by a restaurant that was planned and built by the company, but which is under independent management. This restaurant includes a cafeteria, 63 x 190 ft., for the shop employees, both male and female, and a dining room, 58 x 140 ft., for officers and heads of the departments. The latter is served by waitresses. The kitchen, which is fitted with the most modern type of equipment for preparing and serving food, occupies a space between the dining room and cafeteria. The latter has a seating capacity of 525, and the dining room a seating capacity of 125. The serving counter in the cafeteria extends across the room at one end and down one side along an aisle used to reach the dining room. This counter is arranged with four complete serving units, three of which are now used, permitting speed in serving during the noonday rush.

The lines of employees pass from either side of the dining room between the serving table and an iron railing, and after filling their trays pass out at the double exit in the center. A cashier to whom payment is made is stationed at each of the adjoining exits. This arrangement is shown in the illustration of the cafeteria. A similar double line ar-



Girl Workers and the Families of Plant Employees Are Taught to Swim in the Pool and the Latter also Have the Privilege of Using the Gymnasium

The Cafeteria Is Arranged for Rapid Serving and Four Lines of Patrons Can Be Accommodated during the Noonday Rush



Standardized Bulletin Boards Are Located at Each Time Clock. A Mirror Hung over a Right-angle Turn in the Aisle Warns of Trucks Approaching from Either Direction



range is provided along the counter at the side not shown in the photograph. With the operating of the three lines 450 employees can be served in 15 min. During the rush hour plates filled with meats and vegetables are kept on the serving tables by the attendants so that it is not necessary for a patron to wait for the serving of an individual order, and the lines are kept in continual motion. A metal rack is provided along the serving table permitting the patrons to push their trays along this while loading them.

Employees who carry their own lunch have the privilege of using the tables in the cafeteria. The

regular lunch hour is from 11.30 to 12.30 for the factory and 12 to 1 for the officials and office employees. However, the restaurant is kept open until 6 p. m. to accommodate men engaged in overtime work.

In addition to the cafeteria, several lunch counters are provided throughout the plant where employees may purchase pie, coffee and a few other articles. These counters will be replaced shortly by lunch wagons that will move around the plant.

The restaurant was established to provide wholesome food at reasonable prices, and a very large percentage of the employees are daily patrons of the

cafeteria. As the manager has no rent to pay and is provided with complete equipment, he is able to furnish meals at comparatively low prices.

Safety work is in charge of a general safety committee under which are various subcommittees of workmen. By following this plan the co-operation of the employees is enlisted in this work and many good suggestions for making the plant a safer place in which to work are secured from employees. One of the illustrations shows the use of a mirror as a danger signal. This is placed above a right-angle turn in an aisle. The shelving prevents an employee while walking in the aisle or hauling a truck from seeing an approaching truck in the opposite aisle, but the mirror gives the desired information, and collisions at the turn in the aisle and injuries therefrom are prevented.

Factory badges have been adopted recently for all employees. The badge is in the form of a letter B. Instead of having similar badges for everybody, those for the factory employees are plain nickel silver, those for the foremen have a red background and lettering, and those for the general offices are blue.

A standard bulletin board, shown in one of the illustrations, has been adopted and is located at the side of the time clock in each department. This is provided with five separate spaces for posting notices, one for the general office notices, one for departmental and the other three for notices on welfare work, gymnasium activities and Safety First bulletins.

For several years the company has published a monthly house organ called "The Burroughs Magazine" which has done its share in fostering the community spirit. This is a well edited and well illustrated publication for the men and women in the factory, office and selling and service organizations. It contains illustrated articles on matters of general interest in the plant, safety devices and production methods, personal items, photographs of individuals and a page devoted to sporting activities. The element of human interest predominates in this magazine.

In its Production Department, the company recently established what is known as "The Clearing House" which is operated in connection with the factory manager's office. On the wall in this office is displayed a large factory manufacturing chart on which the various departments are represented by labeled and numbered circles. In these circles pins with colored heads are stuck to indicate conditions in each department. A green pin shows lack of sufficient help; an orange pin lack of equipment; a blue pin that stock is not coming in on schedule, and a red pin that stock is not going out on schedule. This chart also indicates by lines and arrows connecting the circles the routing of material by departments. The chart is kept up to date by reports received from the different departments, and a glance at it shows the production condition that exists in each department at any time.

Another chart in "The Clearing House" shows the daily progress in the production schedule. Wide lines on this chart show the scheduled production of each type of machine by months and days and also the actual production. The daily production schedule is indicated at the bottom of the chart. A glance at this chart shows the actual and the scheduled production for any time, and whether the Production Department is keeping up with its schedule. Each day "The Clearing House" notifies each department by bulletin as to how production stands in respect to the schedule.

Strict Regulation of Explosives

WASHINGTON, Feb. 5.—Stringent regulations for the enforcement of the act of October 6, 1917, governing the manufacture, distribution, storage, use or possession of explosives and their ingredients have been prepared by the Bureau of Mines and will be promulgated within a few days. They are of vital interest to munition manufacturers, for no producer of war material employing any form of explosives is exempt from these requirements unless his entire output is produced for the Government and under official supervision.

Anticipating that the requirements of the law and regulations will prove irksome to manufacturers and others, the regulations are prefaced with the frank acknowledgment that the "operation of this law will doubtless cause inconvenience to persons engaged in legitimate business; it may embarrass worthy citizens in the pursuit of their livelihood; it may necessitate the spending of money by bringing about changes in operating methods; but, to all loyal citizens, these hardships will be slight and temporary, and if we all co-operate in making it an efficient law, disloyalty will suffer the penalty it deserves." This preface indicates fully the purpose of the statute and the regulations which, as stated by the bureau, is "to prevent disloyal persons from procuring explosives or their ingredients and to keep them out of the hands of persons who will not protect them carefully enough to prevent them from being stolen or used for unlawful purposes."

In order that the Government may be able to supervise the industry engaged in producing and utilizing explosives for all purposes and to trace ingredients and finished product from hand to hand, a system of licenses has been adopted for manufacturers, vendors, purchasers, foremen, exporters, importers, analysts, educators and inventors.

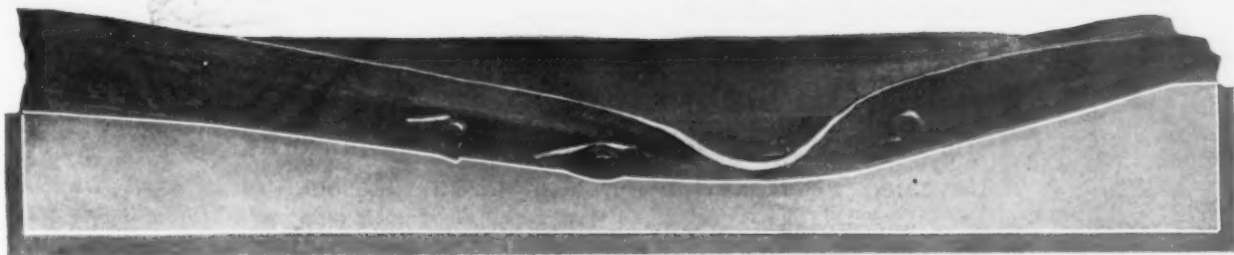
Powder Plants for War Department

Two large smokeless powder plants, each to employ from 10,000 to 15,000, and which together will cost approximately \$100,000,000, will be built by the War Department. The estimated capacity of each plant will be 500,000 lb. of smokeless powder daily. One of the plants will be at Charleston, W. Va., and the other at Nashville, Tenn. Work has begun on the Charleston plant, which will be constructed by the Thompson-Starrett Co. of New York. A contract has been signed with the Du Pont Powder Co. for the construction of the plant at Nashville, where the construction will be done by the Du Pont Engineering Co., a subsidiary of the Du Pont Powder Co. After this plant begins to operate smoothly, it will be turned over to the Government by the company, which will receive a nominal fee for its services. Much of the product of the two new plants will be available for the Allied nations. It is deemed more expedient to ship the finished product abroad than to furnish the Allies with raw materials. The initial output at each plant is expected not later than August next. Under the terms of contract the Du Pont Co. will operate the Nashville plant for a sufficient time to make certain that when turned over to the Government it will have reached the highest operating efficiency.

Wages for British Puddlers

The wage for puddling in Great Britain during December and January, according to the announcement of the Midland Iron and Steel Wages Board, was 17s. 6d. or \$4.258 per ton. All other mill and forge wages remain unchanged. In addition to the puddling rate of 17s. 6d. under the sliding scale, 6d. per ton bonus will be given to the puddlers as heretofore by resolution of the Wages Board which met on July 15, 1912. The bonus applies to puddlers only, and will make the total puddling rate 18s. (\$4.38) per ton.

The Sterling Iron & Steel Co. has opened a yard in Camden, N. J., and will handle the scrap produced by the Victor Talking Machine Co.



Section of the Framework of the German Zeppelin, L-21, Shot Down at Cuffley, England, in September, 1916. It is an aluminum alloy

An Aluminum Alloy from a German Zeppelin

There has been much speculation as to the composition of the framework of the large German Zeppelins. THE IRON AGE is in possession of a small section of the framework of the L 21, which was shot down at Cuffley, England, on Sept. 2, 1916. The illustration above shows its appearance.

It is evidently a rolled material and it is probable that many million feet of this channel-like alloy are rolled for the construction of these large airships. The rivets are plainly visible where various sections have been joined to make up the regular framework. The contour as shown is due to the distortion from bending and breaking. The following analysis of this piece has been obtained from a consulting laboratory:

Per Cent		Per Cent	
Aluminum	91.92	Iron	3.27
Copper	4.13	Silicon	0.65

Magnesium has been reported to play an important part in the alloys used in making Zeppelins but this is not confirmed in the analysis given. Aluminum has been known to be the principal constituent and the lightness of the piece is conclusive evidence of this. But aluminum itself has a tensile strength of only 18,000 to 20,000 lb. per sq. in. and must be made considerably stronger for use in airships. The incorporation of copper with aluminum

is known to greatly strengthen it. One prominent American company produces an alloy of 92 to 93 per cent aluminum and 8 to 7 per cent copper which is claimed to have a tensile strength of about 35,000 lb. per sq. in. In this Zeppelin alloy part of the copper has been replaced with iron—apparently with intention, as it is not probable that this element would appear in so large a proportion as an impurity. It may be that it adds strength to the aluminum-copper alloy or it may increase the rolling properties. An authoritative estimate is that this particular alloy has a tensile strength of close to 40,000 lb. per sq. in. Such strength combined with its extreme lightness makes it an especially valuable material for the framework of monster airships.

The role of the silicon in the mixture is probably not an important one. It is possible that it appears as the result of using the alloy, silicon-copper, as a means of introducing copper into the aluminum. The presence of the iron is interesting. It is known that aluminum will dissolve a certain amount of metallic iron, forming a mechanical mixture but not a chemical union.

The quantity of aluminum in the framework of a modern German Zeppelin is from 10 to 12 tons, according to the notes furnished a London journal by a French officer. This is an enormous bulk, for the metal is very light. The piece represented by the illustration is 8 in. long and 1¼ in. wide. Its weight is about 1 oz.

Manganese in Slags and Its Incorporation in Steel

How manganese may pass from a slag back into the steel in open-hearth practice under certain temperature and other conditions was discussed by J. E. Fletcher in a paper, "Superheating of Slags," before the Society of Chemical Industry at Birmingham, England. His remarks, which have a bearing also on the conservation of manganese, were as follows:

In the production of certain alloy steels the superheating of the working slags results in the separating of the most readily reduced slag constituent. Thus, in making manganese steel in the open-hearth furnace, the primary slag covering the molten pig-iron charge was a rich ferrous slag of the composition approximately $\text{FeO} \cdot \text{Fe}_2\text{O}_3 = 80$ per cent and $\text{SiO}_2 = 20$ per cent, fusible at about 1300 deg. C. Into this a pyrolusite ore containing 85 per cent MnO_2 , 5 per cent $\text{CaO} + \text{MgO}$ and 10 per cent SiO_2 was gradually added. The MnO_2 becomes MnO on superheating, the FeO being changed to Fe_2O_3 by the oxygen liberated from the MnO_2 . It was then found that the FeO and Fe_2O_3 in the slag, if increased by further additions of ore and lime, caused a rapid reduction of the manganese from the slag, manganese entering the liquid metal. When the slag contained over 50 per cent manganese that element entered the metal, whereas if the slag was adjusted so as to contain above 50 per cent iron, then iron was reduced from the slag in preference to manganese. The slags higher in MnO were more fluid than the rich FeO slags, and were apparently fusible at a lower temperature.

The refining of alloys may be illustrated in the case

of the elimination of manganese in the puddling or open-hearth steel processes. Thus the reaction between the slag constituent, $\text{FeO} \cdot \text{Fe}_2\text{O}_3$, and the alloy constituent Mn_2C in the pig iron is of the type:



Manganous oxide displaces the iron oxides in the slag, the manganese in the pig iron being replaced by pure iron from the reduction of the iron oxides. Superheating the slag renders the $\text{FeO} \cdot \text{Fe}_2\text{O}_3$ more active, while that of the molten pig iron increases the instability of the Mn_2C ; carbon monoxide, CO , gas is liberated and the slag is enriched by the entrance of MnO at the cost of the iron oxides $\text{FeO} \cdot \text{Fe}_2\text{O}_3$. In such actions the active oxides $\text{FeO} \cdot \text{Fe}_2\text{O}_3$ are reducing agents. They are least stable and hence in the condition to react with the other unstable compounds present when by superheat their stability is decreased. Possibly at the moment of exchange it is the ferrous oxide which reacts with the Mn_2C in a reversible relation, thus:



Superheating the FeO in an oxidizing atmosphere leads to the formation of Fe_2O_3 . On the other hand, liquid Fe_2O_3 in contact with molten iron-alloys is readily converted to FeO providing a reducing or neutral atmosphere is maintained in the working chamber.

The Southern Canada Power Co., Ltd., Coristine Building, Montreal, Que., is in the market for steel poles, cross-arms, insulators, cross-arm braces, wire and other material for the construction of 100 miles of high-tension transmission lines. C. C. Haskell is purchasing agent.

Tremendous Cost of Hog Island Plant

Highly Unsatisfactory Conditions at New Shipyard Revealed at Investigation—Astonishing Idleness of Workmen — Many Blunders Committed

WASHINGTON, Feb. 5.—A situation of the utmost gravity has developed in connection with the building of the great fabricated shipyard of the American International Corporation at Hog Island, as disclosed during the past week in the investigation of the United States Shipping Board and Emergency Fleet Corporation now being conducted by the Senate Committee on Commerce. It has been made plain that the Government will be called upon to pay an increase of not less than 100 per cent in the estimated cost of this project, which will probably be carried up from \$21,000,000 to more than \$42,000,000 and, what is even more serious, that the completion of the ships to be built by this yard will be greatly delayed and only a relatively small proportion will be delivered during the calendar year 1918. The Senate committee has been forced to the conclusion that so far as meeting the menace of the submarine is concerned the Hog Island yard will not figure as a factor and that only the adoption of the most vigorous measures by the Shipping Board can save this great project from total failure.

The conclusions forced upon the Senate committee respecting the Hog Island yard are not the result of the testimony of hostile critics, but are based upon official reports made to the Shipping Board during the past fortnight by Charles Piez, vice-president and general manager of the Emergency Fleet Corporation; Admiral H. H. Rousseau, manager of the Division of Shipyard Plants; P. L. Reed, engineer of the Emergency Fleet Corporation, and S. M. Felton of the Corps of Engineers, United States Army. While numerous reasons for the failure of the Hog Island plant to meet expectations are cited by Mr. Piez and his assistants, the most important appears to be the cost-plus-profit form of contract under which, as stated by Admiral Rousseau, "the American International Shipbuilding Corporation has no incentive to complete the plant within its original estimate of \$21,000,000." The strictures passed upon the work done at Hog Island constitute the severest indictment of the cost-plus-profit or "agent's" form of contract that have as yet been made and, in view of the extent to which this type of contract has been employed by the Shipping Board and by other departments of the Government and the unsatisfactory results secured, it would not be surprising should Congress adopt the suggestion made by Admiral Rousseau to compel all contractors working under this form of agreement to consent to supplemental stipulations giving the Government greater control of the work and placing definite limitations upon total costs.

Causes of the Delays

The contract of the American International Corporation covers 70 combined troop and cargo ships with a deadweight capacity of 8000 tons each. As agent for the Government, the corporation submitted certain general plans and an estimate amounting to \$21,000,000 for the cost of constructing the plant at Hog Island, but it did not guarantee the accuracy of the estimate, nor was any limit of the cost of plant installation imposed on it. Among the factors that have delayed the completion of the plant and have conspired greatly to increase the estimated cost, Mr. Piez quotes the following:

1. The plant was begun so late in the fall that much of

the heavy construction work had to be done under the handicap of severe winter weather.

2. The location of the plant was such that the railroad facilities supplied by the district were unequal to the needs of the construction work.

3. The location is so isolated and passenger handling facilities leading to it so inadequate that experienced workmen have not sought permanent employment there.

4. The means of handling construction material within the plant site were not made the first order of construction and inadequate driveways and insufficient railroad trackage during the early stages of the work have proved fruitful sources of delay and expense.

5. Material seems to have been ordered without that regard for actual needs and existing facilities of handling that is necessary to prevent undue congestion of railroads leading to the plant.

6. In the desire for speed, men have been taken on in such great numbers that the supervising staff was unequal to the task of effectively directing the workers, with a consequent great loss of output and efficiency. Lower costs and at least equal if not greater progress could have been made if the working force had been kept down to more moderate proportions.

Greatly Increased Costs

Continuing, Mr. Piez says that between 500 and 1000 men are hired at Hog Island daily, and, taking the lower figure as the average, there exists a labor turnover of almost 100 per cent a month, a condition fatal alike to progress and to reasonable costs. "Great masses of men," says Mr. Piez, "cannot be brought together for effective work on so complicated a construction problem as Hog Island unless the supervision is considerably more effective and the attendant conditions more favorable to the prosecution of the war than has been the case at this yard." A few comparisons cited by Mr. Piez show the trend of costs. The completed work on the second group of ways has thus far cost \$286,752, against an estimated cost of \$145,124. The cost of driving 16,252 piles up to Dec. 31 was \$513,163, against an estimated cost of \$89,386, an increase of 574 per cent. The cost of grading 102,000 cu. yd. up to Dec. 31 was \$90,056, against an estimated cost of \$51,000. Temporary roads thus far constructed have cost \$238,801, against an estimated cost of \$100,000. Temporary buildings, temporary telephones and temporary railroads, for which no provision was made in the estimate, have cost \$898,269.

"It is certain," continues Mr. Piez in his report, "that the total cost of the plant completed on the present plan and at this rate of cost will exceed the original estimate by more than 100 per cent, but, setting aside the question of cost, which in this great crisis, is, after all, a subordinate one, it is necessary to inquire whether this expenditure will bring results within the time of our necessity. Our imperative needs are for tonnage within the first eight months of the present year, and our program must, of necessity, bend itself to these needs. A vast program of yard construction on an elaborate plan with a large prospective output in 1919 and 1920 can, under present labor, material and transportation conditions, be carried on only at the direct disadvantage of our immediate ship producing capacity.

A Tremendous Task

"The task at Hog Island is not merely that of constructing a huge shipyard, larger many fold than any heretofore existing, but it involves the equally great and time consuming task of supplying and training

30,000 men to properly use the facilities there planned. Given sufficient time, both of these tasks could be accomplished and Hog Island would stand the greatest ship-producing plant of all the world, but measured by the needs of our immediate necessity, judged by the standard of greatest possible output in 1918 and the first half of 1919, my judgment is that we will turn out more ships if we finish the 32 ways thus far begun, together with that portion of the remainder of the plant which is tributary and essential to this number of ways, and then begin the actual work of ship construction. The remainder of the plant can be completed if the progress of ship construction has demonstrated the capacity of a single management and a single location to yield the expected output. Ship-yards, like other plants, may be so large that they will produce undue stress on the labor supply and the transportation facilities of the locality and they may, on that account, be highly vulnerable to a failure of either. Judging by the conditions at Hog Island, particularly after a study of the progress made at other plants begun at about the same time, one is forced to the conclusion that Hog Island was laid out on too grand a scale; that the site, considering cost, speedy completion and accessibility, was badly chosen; that the yard should have been devoted to the construction of but a single type of vessel instead of imposing upon a new organization the task of completing two radically different types of vessel, and that the construction work should have been concentrated on a quarter of the complete plant so that this quarter might have been immediately available for the construction of vessels, thus affording an opportunity of training up an organization which could have been effectively expanded as the remaining portions of the yard were completed. From such investigation as we have been able to make, it appears, too, that vessels of the Isherwood type of construction would have lent themselves better to the methods of fabricating yards than do vessels of the fishbone type.

"At our request, the American International Corporation has consented to postpone the completion of 18 ways not yet begun and to omit the installation of such trackage and buildings as would serve these 18 ways until the progress of actual ship construction at the plant will justify the completion in accordance with the present general plan of the yard."

Serious Labor Conditions

The labor conditions at the Hog Island yard constitute one of the most serious features of the situation, especially with respect to the early completion of ships. In a report to Chairman Hurley Mr. Felton criticizes severely the way in which the labor problem has been handled. "I watched the men congregated at different points around the yard," he says, "and I should estimate that possibly between five and 10 were working out of every gang of 100. I never in my life saw such idleness. Of course, we know the conditions under which labor is employed and we expect inefficiency, but I believe smaller gangs and more foremen would remedy the defect to a great extent, but good foremen should be selected. Half of the men we saw at work, organized in proper size gangs, would have done more work than all the men that were there the day of our visit.

"The waste and inefficiency can only be explained by the fact, as I understand it, that there is no penalty whatever imposed upon the contractor for excessive costs; no limit to expenditure has been fixed, and he is entirely indifferent as to the amount of money expended. As an illustration of what might be termed extravagance in the employment of labor, my brother, who has charge of labor in Philadelphia, told me that the wages paid had thoroughly demoralized the labor

market in Philadelphia, and had brought there so many men that there was no way to accommodate them. On one night recently they actually had to put them in the vacant cells in the police stations to sleep. This certainly shows a lack of head to the whole program."

Some Severe Criticisms

Mr. Felton also passes severe strictures on the piling, declaring that whoever has inspected it should be called to account or else the specifications should be revised, as many piles have been put down that were not fit to be driven. He also criticizes the use of tie-plates on the tracks in the yard on the ground that they are unnecessary for temporary railroads. Tie-plates, he says, are used for permanent tracks where high-speed trains or very heavy traffic are handled, and only in yards for switching loads where very heavy work is done and to prevent the track from spreading. The explanation made at the yard was that tie-plates had been employed because there were so many bad ties, but Mr. Felton offers the comment on this excuse that it is a "very poor one."

The necessity for prompt reformation in the methods employed at the Hog Island yard is emphasized by Admiral Rousseau. "The situation, in my opinion," he says, "is a grave one from the financial end, and it would seem to me that radical retrenchment as regards unit cost should be effected by our agents at once, or they should be offered the alternative of being required to accept a supplemental agreement that would give the Emergency Fleet Corporation a more direct control over the way in which the money is being spent, or we should require the American International Corporation to agree to a limit of plant cost for the Hog Island work, with the proviso that they would receive a portion of any savings therefrom, and that the Emergency Fleet Corporation might share with them on some percentage basis any excessive cost over the limit fixed. In my opinion the costs given in the accompanying papers cannot be defended or explained satisfactorily."

Better Conditions at Bristol, Pa.

Conditions at the fabricated shipyards at Bristol, Pa., and on Newark Bay, N. J., are described by Mr. Piez in his official report as far more satisfactory than at Hog Island and in striking contrast thereto.

"The second Government yard for the construction of so-called fabricated ships," he says, is located at Bristol, Pa. The Merchant Shipbuilding Corporation is the agent in this case, and contract was entered into on substantially the same basis as in the case of the American International Corporation on Sept. 7. The contract in this case covered the construction of 40 cargo carriers of 9000 deadweight tons capacity, with a speed of 11 knots, and this number has since been increased to a total of 60 vessels of the same type. The plant consists of 12 ways and is estimated to cost about \$10,000,000. Very satisfactory progress has been made and work on actual ship construction will begin in the course of a very few weeks.

"The third Government plant is located on Newark Bay, N. J., covers 28 ways, and the total estimated cost is about \$11,000,000. The contract was signed on Sept. 14 with the Submarine Boat Corporation, which in this case is the agent of the Emergency Fleet Corporation. The contract covers the construction of 150 cargo carriers of 5000 tons capacity, with a speed of 10 knots. Progress at this plant has also been very satisfactory, though the severe winter conditions have made it impossible to begin the work of dredging, of which there is a total of about 3,000,000 cubic yards. Delay from this source may ensue unless weather conditions grow more favorable.

"A survey of the conditions at both Bristol and

Newark Bay but accentuates the impression gained at Hog Island that the progress made at that yard thus far has been far from satisfactory.

Early Completion Necessary

"The Government yards cover a very considerable portion of the shipbuilding program laid down by the Emergency Fleet Corporation and the early completion of these yards and their effective utilization, after completion, are absolutely necessary to the quick accomplishment of our task. The Merchant Shipbuilding Corporation controls the yard of the Chester Shipbuilding Co. and the management has shipbuilding capacity and experience. The American International Corporation, our agent at Hog Island, controls the New York Shipbuilding Co. and may, therefore, be able to draw on that company for shipbuilding experience. The Submarine Boat Corporation has had experience in the construction of small vessels, but has not, to my knowledge, had any experience in the construction of large cargo carriers.

"Unquestionably, when the actual work of ship production in these Government yards begins, the Emergency Fleet Corporation will be under the necessity of exercising a considerably greater degree of supervision and direction than has thus far been the case. The yards have an enormous capacity, the fees paid our agents for operating them are only a fractional part of the profits demanded by other shipbuilders, and if the yards are effectively operated the Government will be reimbursed for the large plant investment by extremely favorable costs, but this end will only be achieved by assuming more positive control of procedures, methods and expenditures than we have heretofore done."

Certain members of the Senate Commerce Committee favor immediate action with reference to the conditions at the Hog Island yard and are disposed to urge legislation in the form of joint resolution or otherwise to meet the situation. Chairman Hurley hopes to bring about improved conditions without such action, however, and he and his entire staff are bending their energies to this end.

W. L. C.

Plates for Canadian Ships

TORONTO, ONT., Feb. 4.—Arrangements have been made whereby a supply of ship plates and steel shapes and angles for the construction of the first vessels to be laid down under the Canadian Government's recently announced shipbuilding program will be procured from the United States. In view of the present lack in Canada of facilities for the rolling of such material, it was necessary to enter into negotiations to obtain it from the United States. Alex. Johnston, Deputy Minister of Marine, and Charles Duguid, Naval Architect of the Department, have been in Washington to discuss the question with the American authorities. They were assisted in their negotiations by Sir Charles Gordon, formerly of the Imperial Munitions Board, and now of the British Purchasing Commission in the United States. They are reported to have been successful in making arrangements, details of which have not yet been made public, but which are satisfactory to the Canadian Government. Most of the shipyards of the Dominion are occupied at present. Ships now under construction, however, will be launched from time to time, beginning about June next. It will then be possible to lay the keels of the first of the Government's projected standardized merchant fleet, upon which an expenditure of some \$60,000,000 annually is proposed. It is estimated that about 300,000 tons annually will be the output of the Canadian yards.

The Dominion Iron & Steel Co., Ltd., Sydney, N. S., will commence work at once on the erection of a coal washing plant to cost \$400,000. C. S. Cameron is secretary-treasurer.

WORKMEN'S COMPENSATION

Large Saving Claimed as Result of Operation of Ohio Plan

A recent bulletin of the Industrial Commission of Ohio contains some interesting information relating to the saving to subscribers to the Ohio fund in the cost of workmen's industrial insurance, as compared with the cost of this insurance if carried with liability insurance companies. Naturally the trend of the bulletin is to advance the cause of State insurance as against liability companies, and numerous figures are given to show the great saving under the former. In making up the computation there were excluded from the computation operations under the Ohio State insurance plan for which the manual of the insurance companies failed to provide specific classifications. Attention is called to the fact that in the comparison the Ohio rate of 1916 of the liability companies is used, but that these companies raised their rates approximately 20 per cent in 1917, but did not revise the Ohio rates at that time because of an act of the Ohio Legislature, forbidding them from the further writing of workmen's compensation insurance in Ohio.

The report states that had the subscribers to the State fund paid the stock company rates from the time the State plan went into effect, March 1, 1912, until May 15, 1917, they would have paid premiums amounting to \$27,174,402. From this total is deducted 2½ per cent for taxes and a further reduction of 16 per cent is made on the assumption that under the merit rating system of the liability companies the credits exceeded the penalty charges to that extent. Deducting these two items, \$22,255,835 is given as the total amount of the premiums that would have been paid under liability company rates. Against these figures the total losses of the subscribers of the Ohio insurance fund to May 15, 1917, are given at \$12,967,486, and with the total cost of administration, \$14,068,893, or a saving of \$8,186,943. In other words, the insurance under the liability companies would have cost 58 per cent more than under the State.

The bulletin states that Ohio is by far the largest carrier of workmen's compensation insurance of any of the states, and that the premium income of the Ohio State insurance plan for 1917 exceeded \$9,000,000, and on the basis of the rates of the liability insurance companies the premiums would have been increased 58 per cent to \$14,220,000. The earned premium of the Ohio State insurance plan for 1917 is given as approximately \$8,000,000, and the total cost of administering, \$312,279. Computed on the basis of their 40 per cent expense ratio it would have cost the liability companies \$5,333,000 to have provided \$8,000,000 in compensation benefits. As a deduction from these figures, it is stated that \$5,000,000 is a conservative estimate of the saving of the subscribers to the Ohio insurance fund during the year 1917. The workmen's compensation premium income of the liability insurance companies in the United States for 1917, according to the bulletin, was in the neighborhood of \$65,000,000. Had all this insurance been carried by the states at the same cost as in Ohio, the figures presented show that the total cost would have been only \$41,600,000, or a saving to employers in a single year of \$23,400,000.

The bulletin states that the State fund plan of workmen's compensation insurance is now in use in 15 states, as compared with one state in 1911. In 1917 the cumulative annual premium income of the State insurance organizations had reached \$53,131,043, and the states are now writing almost one-third as much business as the liability companies which had practically a complete monopoly in the industrial accident field up to six years ago.

The Scullin Steel Co., St. Louis, has acquired a license to use the Orth roof construction for open-hearth furnaces from Frank Orth, Indiana Harbor, Ind., and has adopted the construction on all its furnaces.

GAS-FIRED SHIPYARD FURNACE

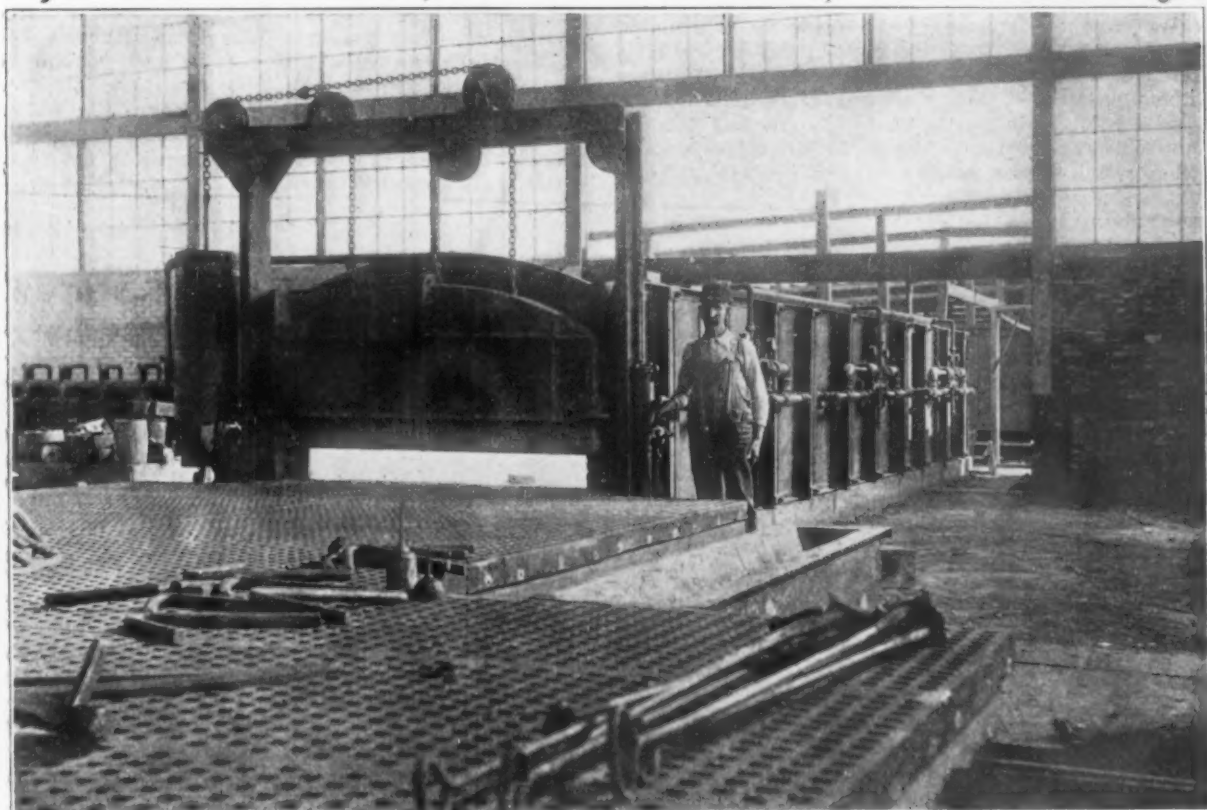
Installation for Plates and Angles at the Pusey & Jones Co., Wilmington, Del.

BY WILLIAM J. HARRIS, JR.*

THE use of city gas in shipyards has in the past apparently been confined to such minor operations as tool room furnaces, soldering iron heaters, etc. In fact, many yards have not seen fit to have any gas service whatever. The larger furnaces for forging and for bending operations on the various structural shapes and plates used in constructing the ships have used either coal or oil fuel. The only exception known to the writer is a plate and angle furnace using city gas at a yard on the Pacific Coast. A description of this installation was recently published in the *Pacific Coast Marine Review*. The usual high relative cost of city gas compared with oil on a B.t.u. basis is no doubt the

distribution with automatic proportioning of gas and atmospheric air at the furnace, and temperature control by adjustment of the gas valve only. The operating temperature is 1800 deg. to 2000 deg. Fahr., depending on the kind of work being done. Higher temperatures are necessary for light work in order that the bending operation may be completed before the steel cools. Heavy pieces hold the heat longer and hence do not have to be quite so hot at the start.

Accurate test data is difficult to obtain owing to the variable nature of the work. The weight of the steel heated, however, is small compared to the size of the furnace. The average gas consumption is from 45,000 to 50,000 cu. ft. per 15-hr. day, and about 5 tons of steel is heated in the same period. At the prevailing rate for this plant of 57 cents per 1000 cu. ft. this costs from \$25.63 to \$28.50 per day. The oil furnace previously in use, which was 6 ft. shorter, used on actual test 457 gal. of fuel oil in a 14-hr. run. For 15-hr. operation, 490 gal. would be required. Even at 6 cents per gallon this would cost \$29.40, while at the



City Gas and Air at a Pressure of 10 Lb. per Sq. In. Supply the Fuel for a Plate and Angle Furnace Operating at from 1800 to 2000 Deg. Fahr. in an Eastern Shipyard

reason why the former fuel has not been used. With an improved burner equipment and furnace design the efficiency is increased to such an extent that this fuel cost difference is overcome. There also seems to have been a feeling among furnace users that gas simply would not do the work. This has probably been caused by attempts which have been made to burn gas with inefficient burners.

The gas fired plate and angle furnace illustrated herewith has proved successful. The even heating of the work, ease of temperature control, lack of scale formation, comfort of workmen due to absence of smoke and oil fumes have been particularly satisfactory. The inside dimensions are 36 ft. long by 6½ ft. wide by 2 ft. 10 in. high at the center of the arch. It has a substantial steel casing and a heavy door which is provided with a compressed air lifting mechanism.

The high pressure gas system is used with a motor-driven rotary compressor operating at a pressure of approximately 10 lb. per sq. in. This gives a one-pipe

present rate of 8 cents it costs \$39.20. The power required for the gas compressor is, if anything, less than that used by the blower for the oil furnace.

The burners are connected in pairs and the number used depends on the length of work to be heated. For example, if the work is about 15 ft. long, the burners in the rear half of the furnace are turned off. Even under these conditions the temperature difference between the front and back is not more than 200 deg. Fahr. When long work is to be heated, more burners are turned on and the whole quickly brought up to the proper heat. The advantage of substantial construction and proper insulation is shown by the fact that even after being shut down for 14 hr. the furnace is hot enough to light without a torch, and only 45 min. is required to bring it to the working temperature. This installation was designed and built by the Surface Combustion Co., Long Island City, N. Y. It is located in the marine department of the Pusey & Jones Co., Wilmington, Del.

*Engineering department, Surface Combustion Co., Long Island City, N. Y.

The High Speed Tools Corporation has removed its New York offices to 43 Exchange Place.

LIMITED FREE TRADE

Important Tariff Measure Relates to Supplies for War Department

WASHINGTON, Feb. 5.—A comprehensive tariff measure of much importance to Government contractors has been introduced in the Senate by Senator Chamberlain and referred to the Committee on Military Affairs. It provides for entry free of duty of all articles or materials imported for the War Department, whether brought in by the Government or by private parties on behalf of the Government, and it has been prepared at the suggestion of the Treasury Department with the general approval of the congressional leaders. There is every reason to believe it will become a law at the present session though its form may be modified and it may have to take an entirely different parliamentary course than that suggested by its reference to the Military Committee of the Senate.

The measure as introduced provides that "during the present emergency upon request made by the Secretary of War to the Secretary of the Treasury, and under such regulations as the Secretary of the Treasury may prescribe, there may be imported into the United States without payment of duty thereon raw materials, parts or partly fabricated parts of equipment, and finished equipment required to hasten or facilitate the production of munitions or machinery of war whenever such duty would otherwise be payable directly or indirectly from appropriations for support of the Army."

Riders not Satisfactory

The existing tariff law grants no exemption from duty to articles imported for the account of the United States. From time to time, however, "riders" have been attached to Army and Navy appropriation bills granting free entry to articles purchased with the funds carried by such measures. The result of this piece-meal legislation has been very confusing to the purchasing departments, to contractors who, in some instances, have made the importations, and to the Treasury Department, which has found great difficulty in framing regulations for the identification of goods brought in for the Government and paid for from the special funds. In many instances, articles have been free of duty, if bought and paid for on June 30, for example, while other articles identical in character paid for on July 1, following, were held to be dutiable, the different treatment being due to the fact that one appropriation bill provided specifically for the free entry of goods purchased thereunder while subsequent budget measures made no such provision.

To meet this situation the Secretary of the Treasury suggested the introduction of a bill covering all purchases for government account and the pending measure to this effect has been drawn by the law officers of the War Department and introduced by Senator Chamberlain at Secretary Baker's request. This bill does not, however, apply to purchases made by the Navy Department and it is possible that it may be amended so as to include everything bought for the Navy as well as the Army.

Very Heavy Imports

Importations of foreign articles and materials made for Government account are now running into millions of dollars. They include guns manufactured in England and France and shipped to this country for the instruction of recruits in cantonments; airplanes made in England, France and Italy and designed for the use of the naval and military flying corps now under instruction or as models for American manufacturers; motor trucks and ambulances imported as models for American car builders; engines for airplanes, motor trucks, etc. Large quantities of foreign material are also being brought in to meet the specifications of Army and Navy contracts and this applies especially to fittings and equipment for cargo vessels, warships, etc.

The proposed measure, when enacted, will have an important bearing upon the cost-plus-profit contracts under which a very large amount of Government work

is now being done. As the measure provides that articles shall be free of duty "whenever such duty would otherwise be payable directly or indirectly" from Government funds, the customs authorities will construe it to cover material imported by contractors as well as importations made by direction of Government officials. As the duties paid on these importations range from 30 to 50 to per cent and in some cases even higher, it is obvious that under the terms of cost-plus-profit contracts, considerable sums are now being paid by the Government as profits on tariff duties paid by the contractors. It is obvious that it makes no difference to the Government whether the War Department pays a duty on an article and the money thus paid is covered into the Treasury, or the article is admitted free of duty in the first instance. It is a very important consideration, however, whether the duty paid by a contractor on imported material shall be permitted to swell his cost of production on which his margin of profit is based.

Parliamentary experts agree that Senator Chamberlain's bill has been referred to the wrong committee and it is also believed that it has been introduced in the wrong house. The measure is clearly an amendment to the tariff act of Oct. 3, 1913, and as such is required by the Constitution to originate in the House, where it would be referred to the Ways and Means Committee. After action by the House the bill would go to the Finance Committee of the Senate and not to the Committee on Military Affairs.

W. L. C.

Volatilization of Phosphorus from 50 Per Cent Ferrosilicon

It develops that there is a considerable volatilization of phosphorus from 50 per cent ferrosilicon under certain conditions. In the course of experiments to evolve the rapid method for the commercial analysis of this alloy, described in THE IRON AGE, Dec. 6, 1917, by Russell E. Lowe, of the Fitzgerald Laboratories, Inc., Niagara Falls, N. Y., the analytical procedures, as worked out, are listed on several samples of ferrosilicon that had been previously analyzed by the Pittsburgh Testing Laboratories by the regular method of procedure. The new method gave excellent checks in all but the phosphorus determinations, and here, invariably, percentages were obtained that were approximately half of that quoted, as the following data shows:

No. of Sample	Per Cent of Phosphorus	
	P. T. L.	Rapid Method
410.....	0.022	0.0103
411.....	0.044	0.022

Feeling quite certain that the fault did not lie in the method but in the sample itself, Mr. Lowe repeated his work, this time using an oxidizing flux of carbonate and nitrate to break down the alloy. The results thus obtained also proved to be about half the reported values for phosphorus.

Sample No. 411 was then returned to the Pittsburgh Testing Laboratories for a new determination of phosphorus. While waiting for their report, an investigation of the laboratory files showed that the first analysis had been made in February, 1908, almost ten years previously. In due time the Pittsburgh Testing Laboratories reported on the phosphorus content of the sample, their value being 0.020 per cent, a very satisfactory check upon the value, 0.022 per cent obtained by the rapid method.

From the above Mr. Lowe concludes that the volatilization of phosphorus from ferrosilicon is considerable, even when the alloy is kept in a dry place enclosed in screw-topped glass jars.

The Penn Seaboard Steel Corporation, Franklin Bank Building, Philadelphia, manufacturer of steel castings, will use about 3500 tons of basic iron per month at its Balducci Works, New Castle, Del., and 2000 tons monthly at its New Haven, Conn., plant. Shipments for this amount have been arranged for by the company, covering the second quarter of the year.

Heating of Coal in Piles

The use of fine sizes of coal to fill the voids as completely as possible and packing the coal thoroughly to restrict the circulation of air are recommended by C. M. Young, assistant professor of mining research, University of Illinois, in a paper for presentation at the February meeting of the American Institute of Mining Engineers at New York. He points out that bituminous coal piled in heaps or bins frequently undergoes a process of spontaneous heating as a result of the absorption of oxygen which is supplied by the air in the interstices between the lumps and by additional air which may enter the pile through circulation. This rise in temperature can be prevented by excluding oxygen, by increasing the bulk of the coal in propor-

Reducing the Cost of Handling Scrap

A new method of loading scrap on cars, resulting in a saving which is claimed to amount to three or four men per day, has been adopted by the Forest City Machine & Forge Co., Cleveland. This company is engaged exclusively in the manufacture of detonators for shells and produces from 30 to 40 tons of scrap per day in light turnings and drillings, this material being very light and bulky and consequently difficult to handle.

To eliminate the expense of loading this bulky material by the usual hand methods, the company installed a portable conveyor, this being a type of equipment built for unloading coal from cars and handling crushed stone, sand, gravel and refuse, but not designed par-



The Use of a Portable Motor-Driven Conveyor Has Effected a Marked Reduction in the Cost of Handling Light Metal Scrap at a Plant Making Detonators for Shells

tion to the exposed surface or by circulating enough air to dissipate the heat produced. The size of the coal largely affects both of the sources of air supply, for if the lumps are small the spaces between them constitute a small percentage of the total volume and little oxygen will be available unless the circulation of air introduces a fresh supply. On the other hand with bigger lumps the percentage is relatively large and circulation is much easier.

In storing coal at the university an attempt has been made to use enough fine coal and to pack it so thoroughly as to prevent the circulation of air, while also reducing the original air in the pile so as to prevent heating. This method was fairly successful although in some cases the piles have heated. An investigation made when a pile was opened for the removal of portions which had begun to heat indicated that heating had occurred only in those parts of the pile which contained comparatively small proportions of fine coal. Samples of coal were taken from the spots where heating was evident and from neighboring regions in which there was no evidence of heating and sized on screens ranging from $\frac{1}{8}$ to 2 in. in diameter of hole. In the case of the samples taken from the heated regions it was found that 36.4 per cent of the coal was between $\frac{1}{2}$ and 1 in. and 32.6 per cent between 1 and 2 in. In the case of the samples taken from the unheated portions 27.5 per cent would not pass through a $\frac{1}{8}$ -in. hole. As the figures quoted are the largest percentages for the various sizes of screens it is evident that the portions of the pile in which fine sizes were present in largest proportions did not contain sufficient oxygen to heat the coal to any noticeable extent and the close packing also restricted circulation so that little fresh oxygen could have been brought in even if the temperature had been raised to such an extent as to favor the circulation of air.

ticularly for handling scrap. It is a belt conveyor driven by a self-contained motor, current being supplied through a long cord attached to a conveniently located plug. The conveyor has a steel frame and is mounted on two wheels so that it can be readily moved around as required.

The scrap is either shoveled upon the belt of the conveyor from the loading platform or when a car for loading is at hand, wheelbarrow loads of material as they come from the shop are lifted by two men and dumped on the conveyor. The conveyor is of sufficient capacity to handle material as fast as it can be loaded.

The conveyor used was built by the Automatic Coal Conveyor Co., Old Colony Building, Chicago. It is made in 12, 16 and 20 ft. lengths, but for loading cars the longest type is recommended.

Classification of Foundry Literature

A classification of foundry literature, recommended by Dr. Richard Moldenke, the American Foundrymen's Association representative on the joint committee for the classification of technical literature, was presented at the last convention of the American Foundrymen's Association. Foundry literature is divided into ten classes, as follows: Generalia; The layout of the shop; Equipment; Raw materials used; Molding processes; Melting processes; Pouring methods; Finishing processes; Laboratory and testing methods; The castings.

Each of these is subdivided and re-subdivided, so that every branch of foundry work is covered. Castings are classified by process of manufacture; that is, cupola, air furnace, open hearth, etc.; by type, as gray iron, chilled, etc.; and by variety, as agricultural, bed plates, cylinders, etc. There are 33 varieties in this latter classification.

British and American Exports After the War

A London View That Competition of the United States in Iron and Steel Will Not Be Formidable—Yet There Are Some "Ifs"

LONDON *Engineering* has an interesting, though in parts misinforming, discussion of "Factors in the World Trade Competition." The iron and steel and metal working trades of the United States will find it suggestive and it is given below in its entirety:

How Great Britain Lagged

The future race for supremacy in the iron, steel and engineering export trade, the world's most important group of manufacturing industries, will probably be mainly between the United States and the United Kingdom. Before the war the Germans, by means of protection, organization, subsidization and hard work, got ahead of us in the steel group of trades, alike in volume of production and in exportation. In the last 30 years before the war the Germans increased their output of iron, steel and engineering products, measured in terms of pig iron, from 3,000,000 tons a year to 19,000,000 tons. In the same period we only increased our output from 8,000,000 tons a year to 9,000,000 tons. We neither kept pace with growth of population nor growth of demand. The world's *per capita* consumption of iron and steel increased by 150 per cent. Our *per capita* production did not increase by 1 per cent. In the last fifteen years before the war the protected, organized and subsidized German trade increased its exports of iron and steel goods from less than 1,000,000 tons a year to 6,000,000 tons, while we, with our much better shipping facilities, our much greater capital investments abroad, our much vaster Colonial possessions and dependencies, and our much more vital need of an abnormal trade in manufactured exports to balance our abnormal food imports—we only in those fifteen years increased our exports of iron and steel from 3,500,000 tons a year to 5,000,000 tons.

We lost the lead because we failed to protect our industries, failed to organize, and failed to work hard. Our statesmen would not give productive industry the slightest protection or encouragement, or even the commonest of fair play. Our manufacturers and shippers would not drop their conservatism, or sink their individualism, and co-operate for the common good. Our workmen lost 100,000,000 separate working days by strikes in ten years, they opposed machinery, they limited apprentices, and deliberately "slow-timed" their work. After the war we have to protect and organize and develop our industries on common sense lines, work diligently, enter into preferential trading arrangements with our colonies and Allies, and avoid German goods. We have to wake up and do these things or perish. We can easily beat Germany if we try, for our resources are better and vaster than those of that country, our shipping facilities are much superior and our trading opportunities—with the best part of the world ready to give us practical preference and boycott the Germans—will be golden and unique. But there remains the question of American competition.

The American Position

American manufacturers, with a big, rich and well-protected home market, will prosper in any case. But our producers are specially dependent upon exports; and it is in export trade that we need to reckon up the possibilities of competition from any and every quarter. In the unprecedented demand for steel and engineering products that will spring up when peace comes—in making good the wastages and damages of war and the arrears of constructions, renewals and repairs that are accumulating—we can afford to neglect competition, but time may bring a race for supremacy between ourselves and the Americans. It is, therefore, useful to examine broadly the comparative resources of the United States and the United Kingdom.

Roughly, there was a world's export trade in iron and steel aggregating 18,000,000 tons a year before the war, valued at more than £200,000,000, besides machinery valued at another £120,000,000. In round figures, Germany was exporting 6,000,000 tons of iron and steel annually; Britain, 5,000,000 tons, and America, 1,500,000 tons.

After the war it is more than probable that this trade will be greater in volume and much greater in value than before the war. It is highly likely that Germany's share will be much smaller than it was before the war, which means that more will stand to be divided between the United Kingdom and the United States. By the way, these three countries—America, Germany and Britain—produce somewhere about 85 per cent of the world's total of iron, steel and engineering products. Until the outbreak of war the United States, although possessing a productive capacity equal to that of Britain and Germany put together, never had more than a meager share of the world's export business, as indicated by the above figures. But the opinion is strongly held in some quarters that America will henceforth undertake an export trade in some way commensurate with her capacity of production. What are the prospects? Briefly, it may be said that in abundance of natural resources and in amplitude of productive capacity, the United States is in a position to undertake something like the lion's share of the steel export business, easily beating both us and the Germans; but that in geographical compactness, in the powers of cheap production, and in shipping facilities, Britain is much better situated. The United States has the most coal and iron ore. The United Kingdom has the best assemblage, manufacturing and shipment accommodation.

The American Peril Overdone

In order to weigh up the position and prospects it is necessary to take a glance backward. Between fifteen and twenty years ago we formed a very wrong idea of the United States as a trading competitor. That wrong idea has cost us dearly. For one thing, it put a blight on our own industrial development and gave Germany a chance, which she seized, to overtake and outdistance us in the steel trade. We must beware of forming wrong ideas now. Future plans must, of necessity, be based upon current ideas. At the time alluded to—the closing years of the Nineteenth Century and the early ones of the Twentieth—Britain was exporting between 3,000,000 tons and 4,000,000 tons a year; America (U. S.) was exporting 1,000,000 tons a year, and Germany was exporting about 750,000 tons a year. There was nothing unnatural in those figures. It was only right that we, depending far more upon food imports than any other country, should export by far the most manufactures. America was a great food-producing country, not needing to export manufactures to balance food imports. Germany, too, was a great agricultural country. But since then we have allowed Germany to get ahead of us in steel exports. We shall beat Germany in the future, and we must not overlook the vital importance of maintaining the supreme position in manufactured exports.

American Low Costs

Between fifteen and twenty years ago, while the resources of America—and of most other countries, for that matter—were egregiously exaggerated, not only by American but by our own public speakers and writers, our own resources were just as absurdly underestimated. It was boldly declared that America could produce the cheapest steel; that we were rapidly becoming industrially bankrupt through the ex-

haustion of our coal and iron supplies, and that the United States would soon flood the world's markets with manufactured goods at prices we could not touch. It was asserted that pig iron—the chief raw material of the steel and engineering trades—was produced nearly 20s. a ton cheaper in America than in Britain. It was contended that our United States rivals had only to increase their capacity sufficiently beyond home requirements to enable them to annex the big bulk of the world's foreign trade. At least one great Englishman became so alarmed that he wrote a pamphlet declaring that our only hope of salvation lay in becoming an American colony! The effects were deplorable. Investors took alarm. Sufficient capital could not be obtained to modernize our old works, or to build new ones. Hundreds of millions of our money went abroad for investment, our industries were starved for want of capital, and the Germans rapidly overtook and eventually outdistanced us in the steel trade.

The "Invasion" Largely Mental

But the threatened "American Invasion" did not materialize. In the fifteen years prior to the outbreak of war, though we failed to keep ahead of Germany, we managed to export nearly a sovereign's worth of iron and steel for every dollar's worth exported by the United States. The Americans vastly increased their capacity. They spent hundreds of millions on new works. Between 1900 and the outbreak of war they increased their steel works capacity, in terms of pig iron or steel ingots, from 15,000,000 tons a year to nearly 40,000,000 tons. But they exported very little more in 1914 than they did in 1900. The bulk of the world's export business had gone to the Germans. Relatively, the Americans declined from a promising second to a bad third place in the race, while the Germans went rapidly ahead from third to first place, and we fell from a long lead to the second position. If we had paid less attention to the threats of American competition, to the exaggerations of the resources of other countries, and to the scares about our own supplies of raw materials, and had kept our industries advancing concurrently with the world's growing demand for manufactures, we should never have been beaten by Germany, nor need we have feared the competition of any other country. It was found, upon investigation, that we were in no danger of running short of coal or iron ore in our time, and it was seen that the Americans offered no serious competition in neutral markets, save in the case of one or two specialties, such as motor cars and typewriters.

Frequently during the ten years before the war we saw between 20 per cent and 40 per cent of United States steel works capacity—plants capitalized at hundreds of millions of dollars—standing idle, while we and the Germans, between us, divided between 80 per cent and 90 per cent of the world's export trade. Although our combined productive capacity was less than that of the United States, we exported something like 10,000,000 tons of iron and steel a year, against America's 1,000,000 tons to 1,500,000 tons.

No Fears Now—Costs Are Up

Now, in view of the coming new international competition, it is of prime importance to inquire why the United States, with such a huge capacity of production, has taken such a meager share of exportation business. The reason is that our American rivals have been unable to produce and ship steel goods at competitive prices, notwithstanding all their great natural resources. And this brings us to the central and supreme fact in the issues involved. With their iron ore deposited a thousand miles from their coal mines, and their iron and steel works mostly between 400 miles and 500 miles from the seaboard, and with wages and salaries exceedingly high, the Americans have not been able to sell at a profit, or at competitive prices, outside their own protected home market. Just as the Americans rapidly increased their works capacity, so the costs of their manufacture advanced. In no other important industry did the costs of production go up so much as in the American steel trade during, say,

the last fifteen years before the war, and as this question of costs is the chief point in the problem of trade it merits special attention. Fifteen years before the war Lake Superior iron ore was mined at about 1s. 8d. per ton—7½d. royalty, or purchase in the ground, and 1s. ½d. for labor. In recent years the royalty has ranged up to 4s. 2d. per ton, largely as a result of the efforts of the Steel Trust to obtain a monopoly of the best ore deposits, and the labor cost has been about 2s. 1d., partly due to the demands for higher wages and partly to deeper and more difficult mining. Again, to get the ore to the smelters—two journeys by rail and one by lake—cost 10s. 6d. per ton in the last few years before the war, against only 8s. 4d. fifteen or twenty years ago. Moreover, the iron yield has declined by one-fifth. The deeper the levels the poorer the ore, as well as the greater the expense of getting it. This involves the consumption of more coal and coke per ton of iron smelted and per ton of finished goods. And all the materials are correspondingly dearer.

The net result was that before the inflation of costs by the war the cost of producing steel in the United States had increased by nearly 50 per cent from the low levels of the end of the Nineteenth Century. In 1908 it was given in evidence before the Ways and Means Committee and the Inland Taxation Authorities that the average cost of producing steel in the best works in the United States was 40 per cent higher than in 1899. Between 1908 and the outbreak of war the costs had gone still higher. In the works controlled by the Steel Trust wages alone have advanced by 46 per cent since the war started. Mr. Gary, the chairman of the Steel Trust, is under no illusion about America's present and prospective competitive powers. He has recently expressed the opinion that the European nations, especially Britain, will emerge from the war with better industrial resources than they exercised before the war. Mr. Powell, president of the Fore River Shipbuilding Corporation, testified to this year's [1917] Foreign Trade Convention (U. S.) that in shipbuilding American wages were 100 per cent higher, and the output per man 12 per cent less, than in the United Kingdom.

American Efficiency Only a Myth

From time to time we hear a great deal about the superiority of American labor, but the figures given in this connection are misleading. They make no due allowance for the vastly greater expenditure on machinery and automatic appliances in America, compared with Britain. If half what we have been told so often about American efficiency and economy had been true, British goods would have been swept clean off the world's markets long ago. The simple fact is that the Americans cannot produce and ship general manufactured goods so cheaply as we can. The war, with its inflation of wages and cost of materials, coupled with abnormal taxation, may considerably modify international competitive conditions. Some high authorities hold the view that one economic effect of the war will be so to enhance our costs as to enable the United States to produce and ship at least as cheaply as ourselves and the Germans. Many American enterprises and associations are laying their plans in this belief.

Now Come the "Ifs"

Much, if not everything, will depend upon ourselves. If we stick too closely to old methods and policies we may be beaten both by Americans and Germans, not to mention other nations. If our statesmen will not protect our markets and encourage enterprise more than they did before the war, if our manufacturers and shippers will not organize better, and if our workmen will not adopt a more enlightened attitude toward machinery and large-scale production, we shall certainly be beaten. But with anything like intelligent co-operation between the state and industry, and between capital and labor, we should again obtain and retain supremacy in the world's export trade. With our coal and iron supplies, manufacturing plants and shipping ports, practically side by side; with our

inherent industrial skill; with our unique transport facilities, and with vast Colonies and great Allies ready to give us practical trading preferences and boycott the Germans, our opportunities will be golden. While the Americans should enjoy highly prosperous trade in their own rich, protected home market, and obtain a considerable share of international business hitherto done by the Germans, we should easily take a long lead in the trade in manufactured exports, and also in shipping.

LARGER SKILLED LABOR SUPPLY

Emergency Demands Extra Effort by Shop Foremen—Breaking in Women Workers

FOUR important steps which can be taken to meet the Government's needs for skilled labor—promotion, division, dilution, and education—are suggested by L. D. Burlingame, industrial superintendent of the Brown & Sharpe Mfg. Co., Providence, R. I., member of the New England committee to supply skilled labor for war emergencies.

Promotion

It is believed that there is a vast amount of latent ability already in our industries awaiting opportunity, or the spur of sufficient incentive to be of great use in this emergency. It is the work of managers and foremen to pick such men from their working force, and to put larger responsibilities squarely up to them.

This will mean extensive re-adjustment, from the fact that foremen, who are now driven to the limit with their work, will not want to lose the services of these men; but here again tact on the part of the management, and added effort on the part of foremen to fill the gaps, will result in a temporary loss only.

Division

There are many operations which do not require great skill except at some particular point, or for the final work of putting on the finishing touches. Less experienced help can be used in such cases for bringing the work along to a certain point, and the skilled workmen can then give the small additional amount of time necessary to complete it.

There are other cases where the work can be divided into classes, such as planing, milling, grinding, even for tool work. By this method production can be increased, and specialists can be employed, instead of men with all-round skill.

Dilution

With the known shortage of skilled labor it is evident that the great increase to its working force must be drawn from the unskilled, thus diluting the expert workers in a way which will require special training and supervision in order to prosecute the work efficiently and to maintain standards of workmanship.

Where there is a reasonable degree of mechanical intelligence, even without experience, intensive training can fit "green" employees for particular lines of work in a remarkably short time. The call for help has been pressing for so long, however, that there is comparatively little left in the man power of the country available for use, and the great supply must come from the employment of women.

The first requisite for the employment of women in a factory is that there shall be proper provision for their comfort and welfare. It is a well-established fact that the employment of women requires that the plant shall be "tuned up" in cleanliness and general orderliness.

Every factory whose product is essential for Government needs should bestir itself to prepare for the employment of women, even before the need becomes actually pressing. Then, by starting in a small way and adding such employees gradually, far better results can be obtained than by waiting for the emergency, and then having to make a general upsetting of the whole shop to provide for it.

The employment of women and other unskilled help puts an extra burden on the shoulders of the fore-

man, in requiring careful instruction and thorough supervision, and this responsibility must be squarely placed upon him, as his share of meeting the nation's needs. Unskilled labor should be carefully graded and put on comparatively simple work at first, such employees being steadily promoted as they acquire proficiency. Employment and training thus go hand in hand.

Education

Technical and trade schools should be called into full service in preparing workers. In some cases, also, the "vestibule" plan, by which a training room is established in the factory for training candidates for positions in productive work in the factory, should be made use of.

It is suggested that an inventory be made of all the laboratory and workshop equipment of the technical and industrial schools of New England, and that a joint meeting of their directors with the Committee be held to devise means for making this equipment most effective in training men and women for essential industries.

It is further suggested that in order to secure intelligent and capable candidates to train for places in industry, a campaign of publicity be undertaken, making an appeal on the line of the call for patriotic service.

Vocational Education Meeting in Philadelphia

Vocational training for after the war conditions and standards of industrial training for women are among the subjects which are to be discussed at the annual meeting of the National Society for the Promotion of Industrial Education to be held in Philadelphia on Feb. 21, 22 and 23.

The after the war meeting is to be held on Friday morning, Feb. 22, in the Bellevue-Stratford Hotel, and Clarence H. Howard, president Commonwealth Steel Co., St. Louis, is chairman. The keynote of the session, to take the outline from the program, is as follows: "The Federal vocational education act provides money for industrial training in 48 States. The dynamic twentieth century industries are split up into highly specialized mechanical processes. The war time pressure for output is increasing specialization in production. The army draft, the scarcity of workers, decreased immigration and economic pressure are bringing in thousands of women, increasing the tendency toward specialized mechanical processes. Many returned and disabled soldiers must be trained for existing conditions. What program of vocational education will meet the new industrial situation?"

One of the papers scheduled for this session is to be contributed by William C. Redfield, Secretary of Commerce, entitled "What Contribution Can Vocational Education Make to the Re-construction Period?" and another, devoted to the training of crippled soldiers, is to be made by Major Frank B. Gilbreth, Engineer Reserve Corps, U. S. A.

The session on industrial training for women is scheduled for the afternoon of Feb. 22 at the Drexel Institute. One of the papers is entitled "Training Women for the Machine Trades" and is to be delivered by Stanley Zweibel, director of industrial education, Bethlehem Steel Co., and another, "What New Industries Have Opened Their Doors to Women During the War?" is to be covered by M. Edith Campbell, vice-chairman, committee on women in industry, committee on labor, Council of National Defense.

The society has completed its first decade, which is regarded as a period of propaganda, with the passage of the Smith-Hughes act. It is therefore at this meeting to discuss what big issues are still before the society, and some discussion is to take place on the future policy and also the name and organization of the society.

The Vermilion Malleable Iron Co., Hoopeston, Ill., is increasing its annealing oven capacity by a 30-ton oven. This company is offering the men of its shop a bonus for the year 1918 equal to 10 per cent of their yearly earnings.

NEW MULTI-SPINDLE MACHINES

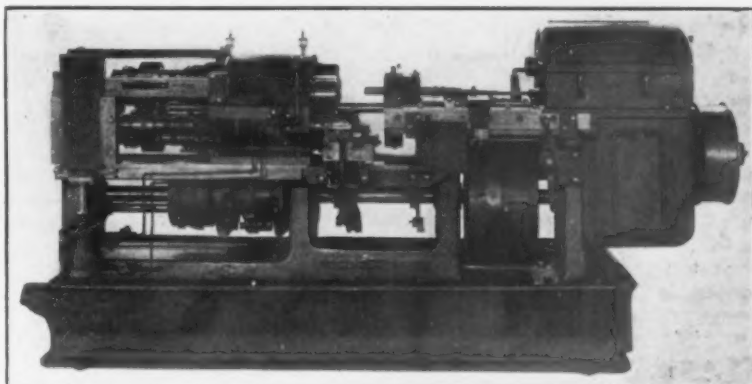
Larger Output and Use of Cross Slide Tools Possible with New Britain Automatics

THE line of automatic screw machinery built by New Britain Machine Co., New Britain, Conn., has recently been increased by the addition of two new styles. Both are of the multi-spindle type and are designed to handle practically the same class of work as the standard single-head automatic chucking machines. Each have the same number of spindles, six, and the general design and construction is the same. One of the machines is designed so that the work is held and revolved by the spindles and the tools are fixed in the tool slide, an arrangement which enables cross slide tools to be employed, while in the other the spindle cylinder does not index, the machine being designed to feed, drill, chamfer and cut off in each position, an arrangement which on simple work such as blanking rolls, pipe couplings, sleeves, etc., enables a production to be obtained which is six times as great as that formerly secured on a machine of the ordinary single-spindle type.

In both machines the spindles are of chrome-nickel forged steel and are mounted in bronze bearings which are tapered on the outside. Provision is made for taking up the wear in the bearings without disturbing their alignment, an arrangement which tends to retain the original accuracy of the machine. The end thrust due to tool pressure is taken by ball thrust collars on the spindles and is said to result in a 30 per cent reduction in the power required for driving.

The design of the tool slide, it is pointed out, is such that the thrust of the work above and below the center line is balanced, thus eliminating any tendency to bring a cramping strain upon the tools. A patented laminated construction similar to that employed in leaf springs is used for the tool slide cam, which permits a single cam to be adjusted to all lengths of work within the capacity of the machine. A large internal gear on the inner circumference of the feed cam drum drives the camshaft and the thrust of the tool slide against the feed cam is taken by a hardened steel roll fixed to the frame which bears against the edge of the drum. Hand levers on each side within reach of the operator control the starting and stopping of the power feed. A hand feed

The base of the machine, which also forms the chip pan, extends to the floor and eliminates the use of legs, as well as providing a broad foundation. The portion of the bed located directly underneath the work has a slope of 45 deg. toward the rear of the machine so that the chips and the work cut off are carried to the side. The chip pan is also sloped toward the oil well and the strainer, which permits the oil to drain off before chips are removed and also makes it possible to rake



The Work Is Held and Revolved by the Spindles and the Tools, Which May Be of the Cross Slide Type, Are Fixed in the Tool Slide in a New Multiple-Spindle Automatic Chucking Machine

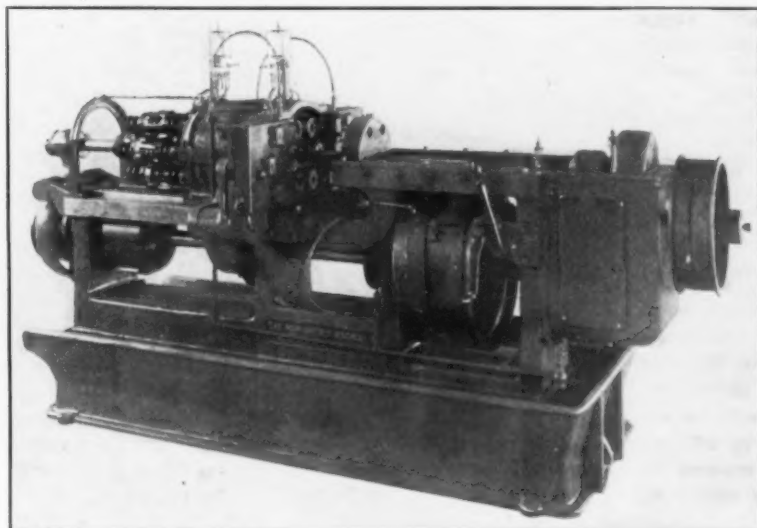
out the chip pan toward the end of the machine without stopping it or removing the splash apron.

Exterior piping has been reduced to an appreciable extent in the oil distributing system. The lubricant is conveyed through the underside of the tool-slide into a chamber at the center surrounding the driving shaft bushing, a series of short tubes radiating from the circumference of this chamber conveying the lubricant to the individual tools.

Machine cut gearing is employed throughout in both machines, worm and bevel gears and chains having been eliminated to a large extent. In the work revolving type five spindle speeds and 12 feed changes are provided and in the other machine six spindle speeds are available, a separate system of change gears being provided for effecting the feed changes by varying the speed of the camshaft. In the case of the work revolving machines the spindle cylinder, which is of heavy design, is indexed at a constant speed, irrespective of production and spindle speed. The mechanism which accomplishes this is patterned after the Geneva movement, gradually accelerating the cylinder at the time of indexing and checking it in the same way. A wide rectangular latch entering notches in the circumference of the spindle cylinder is relied upon to give the final accuracy in indexing.

In both machines the spindle cylinder housing is split horizontally and a loose cover is provided, which enables the spindle bearing adjusting nuts to be reached easily. In the case of the coupling machine it is possible to revolve the cylinder into any desired position by withdrawing the locking pin. The differential motion is regularly fitted to both machines and operates the tool slide at high speed when the tools have finished cutting. In connection with the work revolving machine this motion also indexes the spindle cylinder.

Draw-in spring collets are provided for the first machine and these, it is emphasized, will operate satisfactorily where pieces vary in diameter by not more than $1/32$ in. Where the variation exceeds this figure it is recommended that the parts be sorted into lots and spring chucks adjusted for each. A handwheel that will operate spring chucks for holding the work forms a part of the regular equipment of machine, but if desired a special air chucking attach-



Rolls, Sleeves, Couplings and Similar Pieces Are Produced by a Six-Spindle Automatic Bar Machine Which Is Designed to Feed, Drill, Chamfer and Cut Off in Each Position, thus Greatly Increasing the Production Possible

crank is furnished for testing all feed movements and tool positions and the combination is relied upon to save breakage in setting up, testing and adjusting tools.

ment provided with a large-sized cylinder is provided. This arrangement is operated by low air pressure and, it is pointed out, makes the chucking simpler and quicker, with the result that production is increased where the operations are short.

Russia's Decline in Iron Output

Fortunately for the Central Powers, says the London *Ironmonger*, there has been a tremendous falling off in the Russian coal and iron production since the revolution, but German papers are constantly warning their readers against making sure that Russia is out of the war for good and has lost her power of making munitions. For instance, the *Frankfurter Zeitung*, which is generally exceptionally well informed about Russia, points out that the capacity of the Russian iron plants must not be underrated and would be sufficient, if it could be fully utilized, to fill the whole requirements of the front and of the country. Theoretically the Russian output is 350,000 poods of pig iron a year, but the actual output has never been near that figure. In 1913, 256,836 poods of pig iron were produced, and in 1916 only 231,865 poods. Since the beginning of the present year the decline has been very rapid. In February, 1917, the output only amounted to 14,589 poods, compared with 20,747 poods in February, 1914, and in March, 1917, to 15,070 poods against 23,353 poods in March, 1914. The output of semi-finished steel fell from 272,528 poods in 1914 to 260,886 poods in 1916, and that of finished products from 222,390 poods to 205,862 poods. This decline cannot be attributed to fewer men being employed, the contrary being the fact; it is due solely to lack of discipline and of the lessened individual output resulting therefrom. In December, 1913, the Russian iron works employed 280,626 persons and in December, 1916, 424,246, but the coefficient of production per man fell from 2.7 to 1.64. In the first half of 1917 there was a further decline in the individual output averaging about 0.5. Similar conditions prevailed in the collieries of the Donetz, as is shown by the following returns (in millions of poods) of coal produced in that district:

1916			1917		
May	June	August	May	June	August
140	148	136	127	127	112

Here also the fall in production has been accompanied by an increase in the number of men employed; for example, 233,000 men produced 148,000,000 poods in June, 1916, while in June, 1917, it took 278,000 men to get 127,000,000 poods, which represents a fall per head from 636 to 457 poods per month, the average for the last three years having been 780 poods. Hence, roughly speaking, the Russian workman last summer did only about two-fifths of a fair day's work. But if (and it is admittedly a very large "if") social order should be restored in Russia and a strong government emerge from the present welter, there may be a gradual return to something like normal efficiency in production.

Thrift Stamps Given to Employees

Officials of the Youngstown Sheet & Tube Co., Youngstown, Ohio, will aid the sale of thrift stamps in a very substantial way. On the next pay days, Feb. 7 and 8, thrift cards bearing one stamp worth 25 cents will be given absolutely free to each of the 14,000 employees of the company. Each employee will be expected to fill out the remaining blank spaces by affixing stamps. The company will also have the stamps on sale at its various plants, where they can easily be secured by the workmen.

The vanadium plant of the Chemical Products Co., Louisiana and South Jason streets, South Denver, Col., was destroyed by fire on Jan. 13 with loss of about \$30,000. The works were used exclusively for the production of vanadium steel and will be immediately rebuilt. Lafayette M. Hughes is president.

INTER-MOUNTAIN RATE CASE

Decision of Interest to Pittsburgh as Well as to Western Cities

WASHINGTON, Feb. 5.—A sweeping decision, which it is believed will be the last word in the famous Inter-Mountain Freight Rate Case, has been handed down by the Interstate Commerce Commission in which advances amounting to about 15 per cent are authorized from the east and interior points to the Pacific coast, thus bringing the through rates up to the level of those heretofore maintained to Spokane, Denver, Salt Lake City, Reno and other intermediate cities. The communities mentioned have for many years protested against lower rates to the coast than to intermediate points and the raising of the charges to the terminals is a notable victory and is based largely upon the commission's conclusion that at present there is practically no competition between the East and Pacific Coast points, via the Panama Canal. Incidentally, the Southern Pacific Railroad loses a contention that has been advanced with much vigor to the effect that blanket rates should apply to the coast from Pittsburgh and all points East. Had this been allowed, the big Pittsburgh steel district would have been deprived of advantages heretofore enjoyed by reason of its geographical position and steel producers at or near Atlantic tidewater would have been greatly benefited. Shippers for whom appearances were made in the final hearings in this interesting controversy include the American Bridge Co., National Tube Co., Bethlehem Steel Co., Cambria Steel Co., Alan Wood Iron & Steel Co., United States Cast Iron Pipe & Foundry Co., John A. Roebling's Sons Co., American Brake & Shoe Foundry Co., Union Iron Works, American Stove Co. and Simmons Hardware Co.

In deciding the notable transcontinental rates cases, the commission found that existing water competition by way of the Panama Canal between the east and west coasts of the United States did not justify the maintenance by the rail carriers or water-and-rail carriers of lower rates on commodities from eastern defined territories to Pacific coast points than were contemporaneously maintained on like traffic to intermediate points. Orders were entered requiring the carriers, on or before Oct. 15, 1917, to realign the commodity rates from eastern defined territories to the Pacific coast and intermediate points and under this requirement tariffs were filed, which the commission in the pending case reviews in detail, granting authority in certain cases and denying it in others.

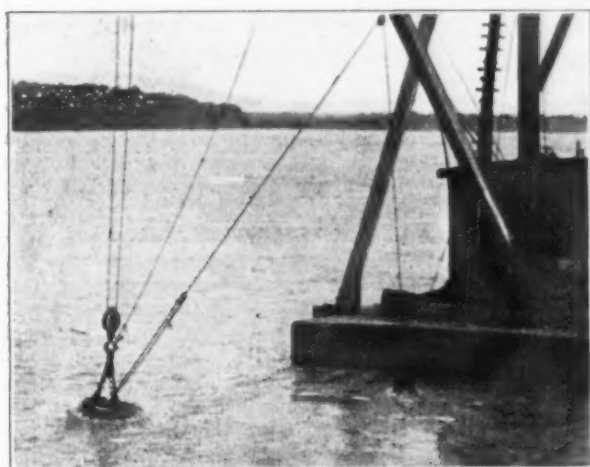
Increased carload commodity rates averaging about 15 per cent from eastern defined territory to the Pacific coast and points intermediate thereto are authorized. A very large tonnage of iron and steel moves to the coast and to intermediate points under these carload rates. Authority to cancel all less-than-carload commodity rates from eastern defined territory to Pacific coast and intermediate points is denied, but the carriers are permitted to file increased less-than-carload commodity rates to the coast provided they are not higher than the present rates on the same items to intermediate points. The application of the Southern Pacific Railroad Co. to file proposed increased rates from its New York piers via water-and-rail routes through Galveston on items as to which it concurs in higher rates via all rail routes to Pacific coast points is denied.

An interesting feature of this case deals with import and export rates to the Orient. The commission grants authority to file increased export commodity rates from eastern defined territories to Pacific coast ports applicable to traffic destined to points in Japan, Australia, New Zealand, Fiji Islands, the Philippine Islands and Asiatic countries, and also permits the carriers to raise import commodity rates from Pacific coast ports eastward on traffic originating in the countries referred to.

The Dover Boiler Works at Dover, N. J., reports the unusual record of 44 years' continuous operation, except when shut down for repairs.

Salvaging Pig Iron With Lifting Magnet

Converting a prospective loss of \$10,000 into an actual profit of approximately \$2,000 was recently made possible by the use of a lifting magnet to raise a barge



The Use of a Lifting Magnet to Recover a Sunken Barge Load of Pig Iron Enabled the Insurance Company to Secure a Profit of \$2,000 instead of Pocketing a \$10,000 Loss

load of pig iron from the bottom of the Tennessee River. In March, 1917, a barge of the Arrow Transportation Co., laden with approximately 420 tons of pig iron, collided with a pier in the Tennessee River near Paducah, Ky. As the water poured into the hold of the barge it produced a list and the cargo, which was insured for \$10,000, was strewn along the river bottom for a distance of over 100 ft. After adjusting the loss the insurance company made arrangements to recover as much of the iron as possible by employing a barge and lifting magnet. The latter, of the 43-in. Cutler-Hammer type, was lowered to the bed of the river, and by dragging it along in the vicinity of the spot where the material had sunk approximately 400 of the 420 tons was recovered.

The salvaged portion of the cargo was sold for \$16,000, due to the rise in the market meanwhile. As the cost of the magnet and the rental of the barges employed amounted to \$4,000 the insurance company obtained a profit of \$2,000 on the operation, together with a lifting magnet that has since been employed in salvaging other cargoes.

City Gas Plants to Recover Toluol

An Eastern plate mill has shipped 13 carloads of plates on a special priority order to gas plants in the East for the construction of toluol tanks. Apparatus will be installed at the behest of the Ordnance Division of the War Department at these gas plants, so that the British thermal basis of measurement may be substituted for the present candlepower basis to the end that the greatest amount of toluol may be extracted.

At the annual meeting of stockholders of the Union Steel Casting Co. held in Pittsburgh recently the following six directors were re-elected for the ensuing year: C. C. Smith, J. P. Allen, S. H. Church, G. W. Eisenbeis, W. P. Potter and J. B. Henry. At the re-organization meeting of the board, held immediately after, C. C. Smith, formerly president, was elected chairman of the board, and J. P. Allen, formerly vice-president, was elected president. The other officers of the company were re-elected as follows: S. H. Church, vice-president; G. W. Eisenbeis, treasurer; W. C. Eichenlaub, secretary, and J. B. Henry, general superintendent.

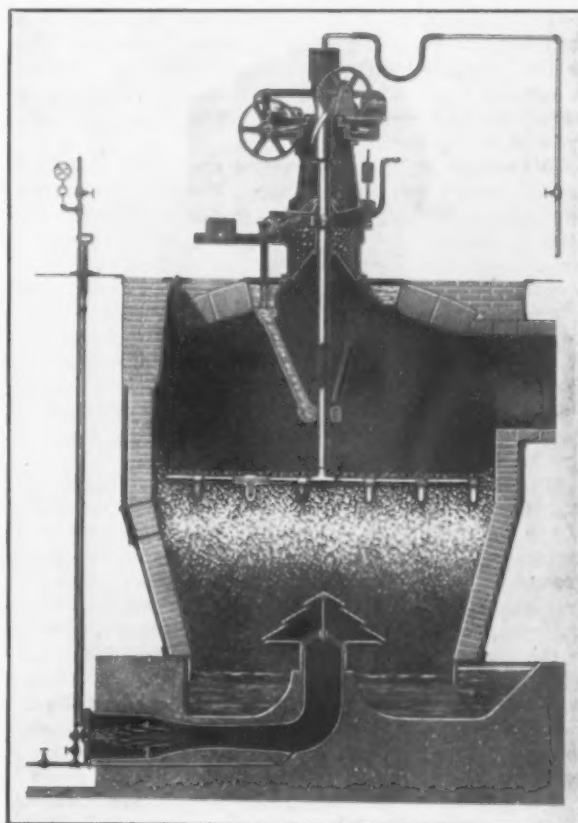
The Lavino Furnace Co., Philadelphia, has been incorporated in Delaware with a capital of \$5,000,000 to operate blast furnaces and smelters. M. M. Clancy, Wilmington, Del., is one of the incorporators.

Gas Producer with Floating Agitator

A recent development made by the Chapman Engineering Co., Mount Vernon, Ohio, in the construction of its gas producer is the provision of a floating agitator to stir up the fuel bed. It is not intended to break up clinkers after they have formed but is relied upon to prevent their formation by destroying the blowholes and hot spots in the fuel bed. Other advantages claimed for the agitator are the elimination of hand poking, as well as a material increase in the capacity of the producers and an improvement in the quality and uniformity of the gas due to the frequent stirring of the entire surface of the fire bed. The specially distinguishing feature of the agitator is the automatic accommodation to varying heights of the fuel bed.

The agitator is built of heavy seamless tubing and in form resembles an inverted T. The cross-arms are provided with stirring fingers of high carbon steel and cooling water is carried to the end of each finger by an inner tube. This arrangement is relied upon to insure positive circulation as well as a means for removing sediment and if desired steam can be used for blowing out the fingers. The agitator passes through the fuel bed at the rate of five revolutions per hour, although this number can be increased if desired. Motor drive is employed, the power being transmitted to a worm and wormwheel running in oil. The lubrication of the jack shaft is provided by a chain oiling device in conjunction with large oil wells and the lower end of the agitator stem is held in place by a water-cooled cast steel ring.

The vertical or floating movement of the agitator resembles on a large scale the compound movement of a Yankee screw driver. The vertical shaft of the agitator has a special driving head with two large screw-



The Use of a Floating Agitator That Automatically Adapts Itself to Variations in the Height of the Fuel Bed in a Gas Producer Is Relied upon to Prevent the Formation of Clinkers by Destroying Blowholes and Hot Spots and Eliminates Hand Poking

like spiral flanges that engage in sliding contact with two lugs projecting inwardly from the driving wheel hub. Ordinarily the wheel and the agitator revolve together, but if an obstruction is encountered or the agitator becomes submerged too deeply in the surface of the fire bed, it automatically screws up at once to a point where the forces are again in balance.

A New Chinese Iron and Steel Plant

Operated Jointly by Chinese and Japanese
Interests—Large Iron Ore Deposits Near
Furnaces—Pig Iron Now Made, Steel Later

THE large iron and coal deposits of the Manchurian district in China and the establishment there in recent years of blast-furnace operations by the Pen-hsi-hu Coal & Iron Co., Ltd., is discussed in a comprehensive paper, "Coal and Iron Deposits of the Pen-hsi-hu District, Manchuria," to be presented at the New York meeting, Feb. 18 to 22, of the American Institute of Mining Engineers, by C. F. Wang, mining engineer of the company. Extracts from the paper are as follows:

Coal and Ore Deposits in Manchuria

As a whole, Manchuria is a mountainous and cold country. The Hei-lung-kiang, or Black Dragon river, forms the boundary between China and Siberia, and the Ya-lu-kiang divides it from Korea. The region to the south and west of these two rivers is rich in forests and mineral resources. These, though yet far from fully developed, are likely to have political as well as economic significance in the future, because of their geographical position. In south Manchuria alone the author has personally seen many deposits of iron, coal, gold, and various non-metallic minerals. The great magnetite belt lies approximately in the central part of South Manchuria around Pen-hsi-hu as a center. It extends from northwest to southeast, beginning with An-shan-chang, Liao-yang prefecture, through Yao-chian-hu, about 20 miles southeast of Mukden, where it disappears, and reappears in a great deposit at Miao-er-kou, about 67 miles southeast. Further southeast, it appears again at Ti-hsun-shan and at Tung-yuan-pu, Feng-huang-cheng prefecture. How much farther it goes is not known definitely.

Magnetite and some hematite are found abundantly at An-shan-chang, on the Dairen-Mukden line, where a new joint company has been established. Other hematite deposits have been reported south and east of An-shan-chang; these are found in various beds of different origin. Deposits of semi-bituminous, coking and bituminous coals have been found near Mukden, at Fentai, Pen-hsi-hu, Niu-shintai and in the southeastern part of southern Manchuria. The two most important companies are the Fushun Colliery, located about 10 miles east of Mukden, now worked by Japanese interests affiliated with the South Manchuria railway, and the Pen-hsi-hu Coal and Iron Co., Limited.

Pen-hsi-hu is about 45 miles southeast of Mukden. It is the center of the great magnetite belt, as well as of the coal beds. The district was named after a little limestone-bordered pond where a stream of underground water flows out all the year around. Two hundred years ago this district was well known for its coal and iron industry, but owing to the underground water in the coal mines it progressively declined from about 1875 till the Russo-Japanese war. There were over 2000 people working there then. The ore for the iron industry was obtained from iron deposits at Miao-er-kou, Niu-shin-tai, and Huo-lien-chai, and today the bottoms of the crucibles which were used for smelting iron by the native method, can be seen in the street employed as bricks for building walls. Before the Russo-Japanese War this town was very prosperous, but after that, and together with the encountering of underground water in the coal mines, both the coal and iron industries came to an end.

The Pen-hsi-hu Coal & Iron Co., Ltd.

After the Russo-Japanese War in October, 1905, Count Okura began to re-open the abandoned coal deposit. It was worked without Chinese permission for several years, until 1908, when H. E. Hsu Shih-chang the Governor of Fengtien Province, proposed to combine Okura's interest with Chinese capital to form a joint

international company. The company, with a capital of \$2,000,000 silver, began operations as the Pen-hsi-hu Coal Co. In 1911, the Miao-er-kou iron deposit was located, and in August, the incorporation of the Pen-hsi-hu Coal and Iron Co., Ltd., with a capital of \$4,000,000 in silver \$2,000,000 from each party was completed. In 1914, an increase became necessary for building the second blast furnace, and the company increased the capital to \$7,000,000, approximately equal to \$3,500,000 gold. At present this company has coal mines producing over 1000 tons of coal per day, limestone quarrying, a coal-washing plant, a coking plant of about 300 tons daily output, a blast furnace of 150 tons capacity and an iron mine at Miao-er-kou producing about 300 tons a day. A second blast furnace is being put up at Pen-hsi-hu. A concentration plant is to be erected at Nan-fen near the main line of the railroad, and a briquetting plant for fine iron ore and concentrates. In the near future a coking plant will be built, and also a steel plant.

Chino-Japanese Organization

This is perhaps the first joint company between Chinese and Japanese. The organization is based on the principle of giving equal participation to both in the personnel. It is therefore to a certain extent a duplicate system, which means more or less waste both in energy and expense. However, it tends to show in a general way that so long as one nationality is not seeking too much advantage over the other, a formal co-operation can exist, and there is certainly much to promote friendship. According to the agreement the chiefs of different departments, chief engineers of the three divisions, and directors are to be represented by both Chinese and Japanese. The first and third are represented in this way, but as for the divisions, the directors decided in January, 1916, to provide only one man for each. It is clear that unless the two men co-operate, conflict is unavoidable. However, the present system seems to work very well. In order to settle any disputes that may arise, and, in a way, to have general oversight of the joint company, the Commissioner for the Foreign Office at Mukden is director-general ex-officio. Two-thirds of the employees are Japanese, while almost all the laborers are Chinese. In comparison with either American or European companies of this kind, or even with Chinese enterprises, the wages paid the employees are low, but the standard of living and the dominant patriotic mood seem to make them adequate to produce a sufficient supply of labor.

The Coking Plant

Pen-hsi-hu coal is of good coking quality. Owing to lack of capital, the coking method still used is the native one. The coking heaps consist of two frustums having the two large ends joined at the ground surface. The diameter of the large end is from 24 to 30 ft. and the small end 16 to 20 ft. The Chinese method is wasteful, but under such conditions it may be adopted. The capacity of each pit varies according to the size and the total thickness of this double frustum. They vary from 70 to 85 tons capacity and can produce 45 to 54 tons of coke, the yield averages about 60 to 65 per cent. This indicates that about 15 per cent of the coal, beside the volatile carbon, is consumed in coking. The coke runs from 16 to 25 per cent ash.

The Iron Deposits

The great magnetite belt in Fengtien Province is extensive in area and the deposits are of large size. Near Liao-yang, at An-shan-chang, poor ores—from 30 to 50 per cent Fe—occur mostly in the form of magnetite

in layers with quartz. Near Mao-chien-hu-tun, at Wai-tou-shan, the ore is 40 to 50 per cent Fe. Magnetite, dipping 45 deg. west and about 100 ft. (30 m.) thick, lies between quartz-porphry and gneiss. At Miaor-kou, the ore zone is 300 to 600 ft. thick, including two rich veins, 50 and 33 ft. thick respectively, and 66 to 70 per cent Fe. The ore lies between walls of talc-schist. Above the talc-schist is gneiss and quartzite. The tunnel intersects pure white talc-schist, chlorite schist, poor ore, and finally the rich ore. The rich ore is so far known to be about 480 ft. long and 50 ft. wide, narrower at the middle and ends. At present there are three levels 120 ft. apart and a fourth level is being driven. A cross-cut from the first level cuts the eastern rich vein, the Ling-nan-k'eng, or Ling-nan pit. Two other rich veins of 15 to 25 ft. exist further east of the Ling-nan pit. This ore belt at Miaor-kou can be traced north for about a mile from where the ore-bin is located, at the point where the gravity plane connects with the light railroad. In a general way, this great magnetite belt probably contains over 500,000,000 tons of ore, including rich and poor, associated with talc-schist and gneiss.

The Concentration Plant

As I have mentioned already, the major part of the deposit at Miaor-kou is composed of poor-grade ore, running from 30 to 55 per cent iron. As around 75 to 80 per cent of the ore is in the magnetic form, and the quantity is so large, a concentration plant for treating it is necessary. This plant is now being erected at Nan-fen, near the railroad station, and will have a capacity of 150 tons per 12 hr. The poor ore is brought in by the narrow-gage railroad on the eastern hillside to the ore-bin, from which it runs into a jaw crusher of 620 by 325 mm. aperture. This crushes the ore to about 1.5 mm. From here it goes through two Gröndal magnetic separators; the magnetite is picked up and separated, the tailings proceed to the classifiers to be sorted into three grades, the heads are sent to the main flow, tailings to waste and the middling pumped back to be re-concentrated on tables. The product from the first Gröndal separators is re-ground with water, in a tube-mill having a diameter of 1.3 m. and length of 5 m., by means of steel and gravel balls, to under 0.07 mm. The ground ore is allowed to run through another set of two Gröndal separators, which are exactly similar to those of the first set. The concentrate from this set is sent to shaking troughs, together with the incoming heads from the tables; from there they are discharged to the railroad cars by means of an overhead crane. The unmagnetic product from the second set of the magnetic separators is pumped to the tables for further concentration. There may be slight changes in the flow sheet, but this is the plan which we expect to follow. From the description above, it is evident that no roasting is required because the ore is magnetic and the gangue rock quartz. Perhaps it will prove to be cheaper to concentrate this magnetite by means of water alone, as experiments made by Prof. Edwin A. Sperry of Pei Yand University and the author indicate that water separation is very effective, and it is far cheaper.

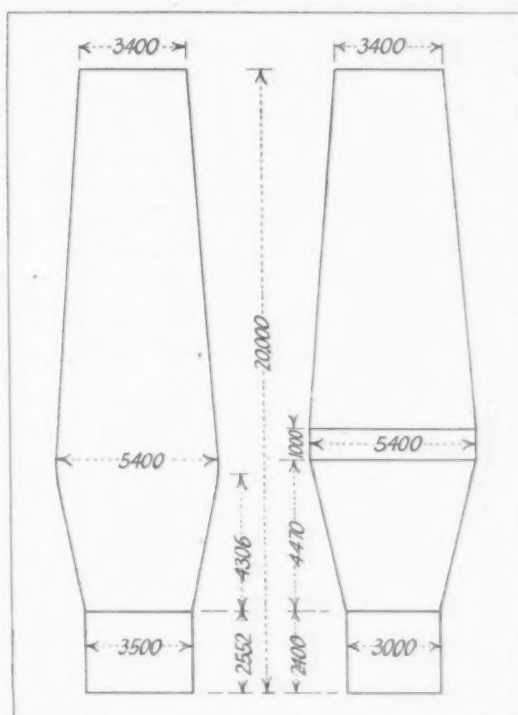
The concentrates from the Nan-fen concentration plant, the fines obtained from the rich ore mined (as this ore is very brittle), and the flue dust from the blast furnaces, are all three mixed in the briquetting plant. This plant is also in the course of construction at Pen-hsi-hu, near the blast furnace. It will consist of two Emperor presses to make bricks at 6% by 6% by 2% in. (171 by 171 by 69.8 mm.), one Sutliff's patent tunnel kiln 230 ft. (70 m.) long and 6 ft. (1.8 m.) cross-section. The kiln will be heated by means of two gas producers, until the briquettes are dry and hard. It is intended to use half concentrate and half rich-ore dust, with a small amount of limestone as cementing material. The chemical laboratory is simply an analytical laboratory.

The Blast Furnace Plant

The first blast furnace was completed in December, 1914, after one year's work for erection. The plan of the company is to build eight blast furnaces and a steel plant. A second blast furnace is approaching

completion this winter. The No. 1 blast furnace was built by Pearson, Knowles and Co. of England at a cost of \$2,400,000 (Mex.) for the whole equipment. It is 83 ft. 3 in. (25.3 m., 7.6 cm.) above ground level, with two exhaust stacks of 75 ft. 9 in. (22.8 m., 22.8 cm.) high, standing above the charging level. The distance between the charging level and hearth bottom is 65 ft. 7 in. (19.8 m., 17.7 cm.). The hearth diameter is 9 ft. 10 $\frac{1}{4}$ in. and 7 ft. 10 $\frac{1}{16}$ in. high. The bosh is 17 ft. 8 $\frac{1}{2}$ in. diameter and height 14 ft. 7 $\frac{1}{16}$ in. The diameter of the furnace tops is 11 ft. 1 $\frac{1}{2}$ in. The cubical capacity of No. 1 blast furnace is 10,279.34 cu. ft.

The second blast furnace is of similar dimensions and of similar design, but is slightly larger in capacity, being 7 cu. ft. bigger. It is being built by the Dairen Sa-ho-k'ou Iron Works from pieces brought from the United States, Japan, and Hanyang Iron and Steel Works because of the war. The furnace has two sets of tuyères, one above the other, with nine tuyères of



Dimensions of the Pen-hsi-hu Blast Furnaces in Millimeters. No. 1 furnace is on the right

4 $\frac{1}{4}$ in. diameter each. The upper set was intended for emergency use, but it was later found better to use both of them. The charging is done by an inclined hoist with a charging bucket of 2 tons capacity. It has a length of 164 ft. with an inclination of 51 deg. The dynamo is 37 hp. There are three hot-blast stoves for No. 1 furnace. They are of the McClure type (three pass), each 90 ft. high (27,432 mm.), 20 ft. (6095 mm.) in diameter, furnished with a stack of 70 ft. (21,316 mm.) high and 6 ft. 3 in. diameter (2057 mm.). The discharge valve of the hot blast is 8 ft. 8 in. (1143 mm.) above the floor. The air is supplied by two turbo-blowers, each having a capacity of 16,000 cu. ft. per minute at 4 to 7 lb. pressure per sq. in. at 3000 r.p.m. They were made in Germany; one is used at a time. The set for No. 2 furnace will be from Switzerland. The second blast furnace is equipped with four hot-blast stoves of the same size; one will be held as reserve for emergencies for either No. 1 or No. 2 blast furnace when a stove needs repairing. We have found that three blast stoves are quite insufficient to keep up a constant blast temperature, especially during the severe cold of winter; as around 40 deg. C. below zero is not uncommon during December, January and February. The blast can be adjusted with cold air to maintain an even temperature blast. The temperature used is from 600 to 650 deg. C. depending upon the kind of iron produced. There is so much dust in the furnace gas that it is impossible to use it for heating under

boilers; it is also injurious to the blast stove bricks. The gas carries so much magnetite and lime dust that the firebricks melt down often after a few days of excessive heating, which is sometimes necessary, especially when only two stoves are operating.

A gas-cleaning plant will be installed with the second blast furnace. The gas from the furnace is first to pass through a dust chamber of spiral type (the dust chamber for No. 1 blast furnace is a two-cylinder type 8500 mm. by 6858 mm. inner cylinder dimension), then through a scrubbing apparatus where the gas is washed with water in fine jets. This gas-washing plant consists of one cleanser and one dryer for the gas from each blast furnace. The cleanser is 79 ft. 4¼ in. (24 m. 10.8 cm.) above ground, 58 ft. 2½ in. (17.6 m. 5.6 cm.) high itself and 15 ft. (4.5 m.) in diameter. It has three sets of wooden baffles with four sets of eight 2½-in. water nozzles followed by two alternate sets of perforated steel tray and wooden hurdles in the path of the down-coming water. The gas is to enter at the bottom and travel upward. The dryer is a cylinder 14 ft. 8¼ in. long and 12 ft. in diameter, with two ends attached each to a frustrum, making a total length of 21 ft. 8¼ in. for the dryer. It is intended to utilize the washed gas for heating boilers which are now being built behind the main power house. There are three boilers for washed gas and two sets of Wilcox and Babcock boilers for coal, in case of emergency. All the firebricks in the blast stoves and for the second blast furnace are made by the Kailan Mining Administration, Tangshan, China. These bricks are fairly good. The forced-draft burner to the blast stoves was changed last year to insure quicker burning and a larger draw of free air from the atmosphere. It is patented in England by the company's department engineer, S. Sugimoto.

Bricks from the Slag

The slag is used for filling low areas of the company's ground. Recently we have been disintegrating the slag with a nozzle of water and using it for making slag bricks. The second slag notch is specially used for this purpose. The slag is mixed with one-fourth lime, ground by two Chilean mills, and molded by hand, either by men or women, into bricks. These bricks withstand crushing well and they set after 2 weeks' time; the longer the stronger. They are not burned and they cost about \$7 silver per thousand, including everything, which is about the same price as the burned red bricks. Behind the furnaces is the ore and limestone yard, which is connected by railroads. The limestone is now transported here directly from the quarry by means of aerial tram of over 6000 ft. (1828 m.) length. Each bucket holds ¼ ton weight, the total number of buckets being 70. To run this aerial line, a 36-hp. dynamo is used, but the line is mostly self-running by gravity. All trestles are made of wood. The cost was about \$30,000 Mex. for this installation. The limestone costs about 70 c. per ton, or \$0.35 gold. Coke is loaded on cars from the coking yard directly to the inclined hoist, taking 2 tons each time. The coke costs about \$7 Mex. or \$3.50 gold per ton, delivered at the charging station.

The first blow-in was made on Jan. 13, 1915. It was thought that hematite was necessary to mix with the rich magnetite for smelting; accordingly hematite ores from Kaisan, Angaku and Sainai, Korea, were bought. Some analyses of these ores are as follows:

Analyses of Korean Iron Ores

Ore	Fe	SiO ₂	Al ₂ O ₃	CaO	MgO	P	S
Rich ore	65.85	5.09	0.55	0.88	....	0.021	0.551
Kaisan ore	47.31	13.51	1.60	1.670	0.615	0.063	0.051
Angaku ore ..	49.97	21.67	1.40	1.14	0.688	0.034	0.73
Sainai ore	51.73	19.80	2.14	1.06	....	0.069	1.53

These ores were mixed proportionately, but the output during 1915 was small. The high ash and especially the high alumina ash in the coke, makes the slag high in alumina; as a result the slag became very viscous. At the same time, the blast stoves could not produce sufficient hot blast. This led the engineer in charge to think that since the upper set of tuyères

was still left idle, he would try to use the two sets together. The attempt was successful, and he began to improve the blast-stove burner because of the greater amount of hot blast required. In the latter part of 1915, and during April and May, 1916, exclusive use of magnetite was tried; for a few months a charge of 47 ore 14.5 limestone and 40 coke, producing a slag of 28.25 per cent SiO₂; 25.13 per cent Al₂O₃, and 41.27 per cent CaO. The average production has been raised from 120 to 150 tons and over per day for 3 months, reducing the coke ratio from 1.5 to 1.1 per ton pig iron.

But the pig iron produced is not of high grade. Owing to the use of both sets of tuyères, the smelting zone has been pushed up; undoubtedly many explosions in the hearth can be attributed to this practice; but this high heat provides the heat required for such viscous slags. To bring the alumina lower and silica higher, siliceous ore (Kaisan ore) was again used to mix in, at the end of May, 1916. A sudden drop of output immediately ensued, from 147 down to 109 tons per day, but gradually, with adjustment of charge, it again reached and then broke the record, 158 tons being averaged per day for a month in November. The slag has been brought to SiO₂, 30 per cent.; Al₂O₃, 19 per cent.; CaO, 44 per cent.; which is a much better slag to run with. The temperature of the blast also has been better adjusted, being around 650 deg. all the time since June. The record shows clearly with temperature constant and other things remaining the same, that a slag of higher silica and lower alumina is a better slag. If the addition of Korean ore is nothing but a question of silica there is no need of paying high freight rates to transport these low-grade iron ores from Korea, as we have more than plenty of low-grade magnetite at our disposal. The practice is now generally abandoned, and our own ores will be exclusively used from now on.

In the short life of the first furnace, not yet two years, we have had many explosions below the slag-notch level, bursting the hearth cylinder through into holes. Also, we have some hang-ups, but usually they do not cause great inconvenience, as with some adjustment of the blast or otherwise they usually come down. I believe that the reason for such explosions, which are not common in other smelters, is two-fold; one, the high heat produced by the two sets of tuyères and the other the inverted hearth bottom. This can be noticed in the drawing. The remedy for this, I believe, is the calculation of a better slag charge; this will mean also that we should have lower ash coke if possible. The sulphur content of that now used is another very objectionable quality. We make the slag very limy, around 50 per cent CaO sometimes, in order to get out the high sulphur.

The pig iron output in 1914 was 29,519.87 tons, or 97.07 tons per day; in 1915 it was 49,211.49 tons, or 134.46 tons per day. Over 85 per cent of our pig iron is exported to Japan, while the home market at Mukden and Dairen, and the Chinese Eastern and Southern Manchuria railroads absorbs about 11 per cent, leaving a small amount for our own use.

Koppers Plant at St. Paul Placed in Operation

The new plant of 65 Koppers ovens built by the H. Koppers Co. for the Minnesota By-Product Coke Co. at St. Paul, Minn., was placed in operation on Jan. 18. This plant will supply foundry and metallurgical coke to the Northwest and domestic coke to the Twin Cities. This plant is probably the most complete and efficient plant ever built by the H. Koppers Co. A feature of the beginning of operation was that the benzol plant was ready to start with the ovens and light oil production was achieved before the first oven had been pushed. Owing to the shortage of domestic fuel in the Northwest this year, the production of 800 tons of coke per day will be a great benefit to the people of the Twin Cities. T. G. Janney is manager of the Minnesota By-Product Coke Co. and Karl G. Richards superintendent. The general office of the company is in Pittsburgh, the officers being H. B. Rust, president; C. J. Ramsburg and W. F. Rust, vice-presidents.

THE EROSION OF GUNS

Detailed Investigation of the Causes, Based on the Examination of a 14-in. Naval Gun

A MONUMENTAL discussion, practically a treatise, on "The Erosion of Guns," is to be presented by Dr. Henry M. Howe, Bedford Hills, N. Y., at the New York meeting, Feb. 18 to 22, of the American Institute of Mining Engineers. It covers every phase of this complex subject and contains 64 different subdivisions or subjects in a total of 56 pages. In introducing his paper Dr. Howe, says:

This paper is based in large part on the examination of two rings, cut from an eroded 14-in. (35.56-cm.) gun liner, and containing, according to Booth, Garrett, and Blair [chemists, Philadelphia]: Carbon, 0.380 per cent; manganese, 0.655 per cent.; nickel, 2.810 per cent; vanadium, 0; chromium, a few hundredths of 1 per cent; tungsten, 0; molybdenum, 0. These rings were received from Admiral Joseph Strauss, then chief of ordnance, United States Navy, through the kindness of Hudson Maxim, chairman of the committee on ordnance and explosive, of the United States Naval Consulting Board. I also discuss Professor Fay's interesting paper on this subject.*

The gun from which these rings were cut was 642.5 in. (53 ft. 6.5 in.—16.32 m.) long over all, and had been worn out at the proving ground by firing 170 rounds. The rear ring was cut at the origin of rifling, the forward one at 207 in. (17 ft. 3 in.—5.26 m.) from the breech face, or about one-third way from the breech to muzzle. I understand that these guns weigh 63 tons, and fire a shell weighing 1400 lb. with a muzzle velocity of 2600 ft. per sec. and a muzzle energy of 65,000 ft.-tons. The erosion has been marked in the forward ring, while in the rear one it has erased the lands almost completely.

A metallurgist in writing about this intricate subject on which he is necessarily inexpert, must appeal to the indulgence of the expert. His excuse for his intrusion must be that through his familiarity with hardening and with the behavior of the micro-constituents of steel under other conditions he may help the expert to a true understanding of these phases of the subject.

Physical and Chemical Phenomena

A summary of the paper, prepared by the author, is as follows:

It is divided into three parts, which treat severally of the hardening of the bore by its rapid cooling by the outer metal, the cumulative cracking of the bore and possible palliatives of erosion. The explanations of the various phenomena are based chiefly on a hypothetical 'temperature cycle,' or course of heating and expansion in each round.

At any section the cycle begins with the passage of the driving band of the projectile, from which the lips of each crack, hardened in the preceding round and still cool, bite off a mouthful of copper, thus sealing themselves. Next comes extremely rapid heating, expansion, and closing of the cracks, with extrusion of much of the copper. A thin layer of the bore face is melted and swept forward by the rush of the gases, together with so much of the metal outside it as is heated to erodible mobility, the metal removed from any one section being thus replaced in part by that swept forward from rear sections, and this forward sweeping layer keeping all cracks sealed till the bore-face metal again hardens. With this forward sweeping probably goes the entrainment of some of the molten metal in the form of a mist, its bodily removal from the gun, and the choke-boring of the gun. Thus the erosion at any given section consists first of this misty entrainment, and second of the excess of the metal swept forward from that section over that swept to it.

In the heating period, brief as it is, some of the initially distinct particles of ferrite and cementite in a

very thin layer adjoining the bore face merge to form austenite. The following cooling by conduction into the cold outer metal is so rapid that this austenite is caught in the state of martensite and is thus hardened. It is next annealed during the heating period of the next round and in part eroded and re-hardened in the following cooling. Thus the hardening is repetitive.

The thickness of this hardened layer increases asymptotically from round to round, because the heating in each round extends beyond the layer actually hardened in the ensuing cooling, and in thus extending begins the merging of the ferrite and cementite beyond the layer hardened, and thus facilitates further merging and thus hardening in the next round.

Though we might well expect the powder gases to carburize the bore face and thus to increase the hardening, on closer examination we see that appreciable carburization is very improbable because of the brevity of the total time. It is proved to be lacking in my forward ring.

Hardening may hasten erosion, by causing particles to flake off from the bore face while it is heating up.

In the cooling of each round the layer which has been fluid or at least pasty cools and hence contracts much more than the outer and cooler metal with which it is integrally united, and thus becomes in effect stretched by the resistance of this strong outer cold metal beyond its ability to retain continuity, and thus cracks.

In the grooves the expansion has to be axisward solely, and the cracking in the subsequent cooling is, therefore, about the same longitudinally as circumferentially. But the forward rush of the gases exaggerates the longitudinal cracks, so that the longitudinal ones are more prominent than the transverse. The expansion of the lands occurs both axisward and circumferentially, and the corresponding circumferential contraction in large part relieves the tendency to form longitudinal cracks, with the result that the main cracks are transverse.

The copper stopping of each crack, and the oxidation of its sides during the period of contraction, cause the cracking to be cumulative, so that the total width of the cracks, including their copper stoppings, is about 10 times that corresponding to the contraction occurring in a single round. The transverse cracks on the strongly pressed lands are so much more prominent than those in the grooves, and have such an approach to even spacing, as to suggest strongly that they are exaggerated by chattering.

In the forward lands many of the cracks are filled flush with copper. The rest are black and not filled flush. A copper network projects from the forward grooves. The difference is referred jointly to the continuation of the expansion in the grooves till a later period than in the lands, and to less violence of the gas-rush in the grooves than on the lands, with the result that all the copper ejected by the expansion from the land cracks is wiped away by the gases, while the latest extruded from the groove cracks persists.

The cracking of the bore probably neither hastens erosion nor weakens the gun.

The temperature of the metal eroded probably rises at least to the solidus, if not to the liquidus or even beyond it, but some of the metal eroded is probably between the solidus and a lower temperature, that of erodible mobility.

Volatilization probably does not contribute greatly to erosion.

White-hardness, and also great thermal conductivity, specific heat, and density, should lessen erosion.

Of the palliatives of erosion, the replacement of the liner seems the most promising.

Though experiments with other alloys of high melting point should be tried, the prospect of success is not great, because the available metals more infusible than iron are thought to yield alloys less infusible than it, and also difficult to machine, costly, and prone to oxidize.

The success of manganese steel in pipe balls in resisting conditions closely like those of gun tubes suggest experimenting with it.

*H. Fay: Erosion of Guns—The Hardening of the Surface. *Bulletin American Institute of Mining Engineers*, December, 1916.

Record Breaking Exports of Iron and Steel

License System and Many Unfavorable Conditions Do Not Prevent Tremendous Movement to Foreign Lands—Imports Very Light

WASHINGTON, Feb. 5.—All records have fallen before the stupendous exports of iron and steel both for December and for the calendar year 1917. Shipments of iron and steel by values, tonnage commodities, and machinery rose to new high levels, both for December and for the full year, the margins for the twelve-month showing heavy gains over the previously unbeaten totals for 1916. The astonishing record made in the closing month of the year is the more notable when it is considered in connection with prevailing licensing restrictions, fuel and labor shortages, railroad congestion, and limited steamship charters. What the story would have been had the mills been running full time, the railroads operating freely and ample vessel cargo space available, can well be left to the imagination.

The total exports of iron and steel by values in December gained no less than 35 per cent over the corresponding month of 1916 and exceeded by about one-half of one per cent the record monthly total of June, 1917. Shipments of tonnage iron and steel in December gained 13 per cent over the corresponding month of 1916 and surpassed by 2 per cent the high-water mark of this movement scored in September, 1916. The exports of machinery, which in recent months have been the leading feature of the foreign trade, in December rose 42.6 per cent above the corresponding month of 1916 and exceeded the record shipments of October, 1917, by 6 per cent. Machine tools, which have been declining for many months, recorded a loss in December of 30 per cent as compared with the same month of 1916.

For the calendar year 1917, a gain of 43 per cent was made in the value of the total exports as compared

Exports of Iron and Steel

	December		Calendar Year	
	1916 Gross Tons	1917 Gross Tons	1916 Gross Tons	1917 Gross Tons
Pig iron	105,195	.....	612,241	b377,094
Ferromanganese .....	.....	a811	.....	a5,468
Ferrosilicon .....	.....	a1,035	.....	a6,863
All other pig iron .....	.....	a64,727	.....	a265,840
Scrap	14,860	857	212,765	150,560
Bar iron	6,364	6,919	74,108	56,332
Wire rods	13,415	20,759	158,171	181,949
Steel bars	63,289	78,571	773,997	626,466
Billets, ingots and blooms, n.e.s.	162,901	204,555	1,508,727	2,013,459
Bolts and nuts	2,231	4,365	29,225	214,876
Hoops and bands	3,038	7,343	44,001	58,876
Horseshoes	145	759	7,819	8,491
Cut nails	222	617	4,761	4,537
Wire nails	11,012	16,830	150,171	114,764
Wood screws .....	.....	a418	.....	a1,800
All other nails, including tacks	1,303	1,681	12,393	19,347
Cast-iron pipes and fittings	5,765	7,446	70,223	78,029
Wrought pipes and fittings	14,157	9,093	158,349	128,089
Radiators and cast-iron house-heating boilers	197	430	2,423	5,201
Railroad spikes	1,391	1,285	23,852	21,179
Steel rails	41,112	50,935	540,349	510,439
Galvanized iron sheets and plates	7,736	6,981	84,303	86,485
All other iron sheets and plates	3,816	8,826	46,402	62,237
Steel plates	25,999	45,299	275,984	530,866
Steel sheets	12,639	23,776	108,167	157,363
Ship and tank plates, punched and shaped .....	.....	a1,173	.....	a13,254
Structural iron and steel	35,648	34,567	301,649	296,968
Tin and terne plates	18,229	24,026	227,348	188,676
Barb wire	15,820	14,907	418,883	192,404
All other wire	14,484	17,053	263,517	192,434
Total	580,961	656,044	6,102,104	6,227,737

a Not separately enumerated prior to July 1, 1917.

b Six months ending June 30, 1917.

Exports of Machinery

	December		Calendar Year	
	1916	1917	1916	1917
Adding machines	\$163,414	\$180,039	\$1,428,131	\$2,349,248
Air-compressing machinery	110,573	172,625	883,827	1,199,319
Brewers' machinery	1,387	81,914	14,915	231,120
Cash registers	135,698	60,862	1,620,677	828,490
Parts of	7,500	7,043	137,705	79,924
Concrete mixers .....	.....	a37,054	.....	a154,388
Cotton gins	13,068	29,673	99,650	110,066
Cream separators	12,529	68,415	416,054	600,279
Elevators and elevator machinery	150,109	229,404	1,801,319	2,279,365
Electric locomotives	81,645	15,089	615,821	396,271
Gas engines, stationary	50,334	54,668	406,297	840,175
Gasoline engines	1,060,398	3,249,743	14,323,036	26,064,517
Kerosene engines .....	.....	a591,281	.....	a2,009,915
Steam engines	1,056,948	3,121,145	11,412,452	35,045,398
All other engines	168,054	311,184	4,844,731	3,655,458
Parts of	2,222,978	.....	13,672,861	b9,287,245
Boilers .....	.....	a970,210	.....	a2,482,172
Boiler tubes .....	.....	a785,381	.....	a4,772,515
All other parts of engines .....	.....	a1,795,183	.....	a8,535,584
Excavating machinery .....	.....	a60,445	.....	a497,961
Milling machinery, flour and grist	67,126	132,666	2,043,765	849,635
Laundry machinery, power	27,008	27,219	300,180	431,785
All other	30,368	61,210	283,765	298,888
Lawn mowers	9,750	15,711	215,837	247,752
Metal-working machinery (including metal-working tools)	6,506,205	.....	79,698,861	b44,604,259
Lathes .....	.....	a1,656,906	.....	a10,107,365
Other machine tools .....	.....	a1,013,442	.....	a5,459,100
Sharpening and grinding machines .....	.....	a489,768	.....	a3,287,488
All other metal-working machinery .....	.....	a1,490,209	.....	a13,066,468
Meters, gas and water	35,309	58,041	364,050	1,217,649
Mining machinery, oil well	165,128	169,700	1,980,319	1,747,405
All other	649,262	1,417,209	7,248,172	11,120,128
Paper-mill machinery	254,361	272,182	1,285,500	1,996,685
Printing presses	233,874	144,646	1,987,092	1,606,619
Pumps and pumping machinery	487,331	780,120	5,634,297	6,559,643
Refrigerating and ice-making machinery	56,853	197,493	677,196	1,324,023
Road-making machinery .....	.....	a9,867	.....	a244,944
Sewing machines	579,684	745,805	5,607,445	8,137,482
Shoe machinery	150,775	186,256	1,107,851	1,662,892
Sugar-mill machinery	1,413,046	2,321,845	9,058,347	11,471,779
Textile machinery	329,725	546,333	3,542,036	4,056,880
Typesetting machines	107,782	108,285	1,141,778	1,300,677
Typewriting machines	903,520	657,446	10,845,064	9,377,768
Windmills	61,562	164,854	999,059	1,213,836
Woodworking machinery, saw mill	41,420	136,287	458,160	707,535
All other	54,532	81,422	884,410	1,066,794
All other machinery and parts of	3,699,829	5,344,312	39,411,964	43,019,073
Total	\$21,099,087	\$30,051,092	\$226,461,624	\$287,623,962

a Not separately enumerated prior to July 1, 1917.

b Six months ending June 30, 1917.

with 1916, which in turn surpassed any previous year by more than 125 per cent. The extent to which machinery figured in the aggregate value of the shipments of 1917 is reflected in the narrow margin by which the exports of tonnage commodities in that year exceeded those of 1916, the gain being but a bare 2 per cent. Machinery exports for the calendar year 1917, however, rose 28 per cent over those of 1916, which were nearly 100 per cent above the shipments of any previous year. Notwithstanding the sharp declines recorded from time to time the monthly reports covering exports of machine tools, the total for the year fell but 5 per cent below the record of 1916.

The value of all exports of iron and steel products in December was \$119,635,609 compared with \$88,536,958 for the same month of 1916 and \$119,141,972 for June,

	December		Calendar Year	
	1916	1917	1916	1917
	Gross	Gross	Gross	Gross
	Tons	Tons	Tons	Tons
Ferromanganese	4,531	2,959	90,928	45,381
Ferrosilicon	292	845	6,739	9,740
All other pig iron	3,353	1,339	37,682	21,665
Scrap	31,424	3,428	116,039	180,034
Bar iron	277	1	7,701	2,240
Structural iron and steel	261	777	1,473	6,016
Steel billets without al-				
loys	1,242	1,738	10,255	35,860
All other steel billets ..	1,309	708	15,588	8,357
Steel rails	522	1,428	26,999	9,263
Sheets and plates	244	214	1,735	1,447
Tin and terne plates ..	34	.....	1,019	124
Tin scrap .....	.....	873	.....	8,556
Wire rods	653	332	4,131	1,059
Total	44,142	14,642	319,589	329,922
Imports of Manganese				
Manganese, oxide and				
ore of	49,796	30,549	576,321	629,972

1917, which was the previous high record. For the calendar year 1917, the aggregate was \$1,243,803,675 as compared with \$867,323,044 for 1916 and \$388,400,832 in 1915. Exports of machinery in December were valued at \$30,015,092 as compared with \$21,099,087 for the same month a year ago. The highest total previously recorded was that of October, 1917, when the machinery shipments were valued at \$28,488,426. For the calendar year 1917, the exports of machinery were valued at \$287,623,962 as against \$226,461,624 for 1916.

Shipments of metal-working machinery in December aggregated \$4,650,325, as against \$6,506,205 for the same month of 1916. For the year 1917, the machine tool exports totaled \$76,524,680 as compared with \$79,698,861 in 1916. Details of the exports of machinery in December, 1916 and 1917, and for the two calendar years are given in the accompanying table.

Exports of iron and steel for which quantities are given aggregated 656,044 gross tons in December, 1917, as compared with 580,961 tons for the same month of 1916. The previous record total of exports of tonnage commodities, 643,763 gross tons, was made in September, 1916. For the calendar year 1917, these shipments aggregated 6,227,737 gross tons as compared with 6,102,104 tons for the same period of 1916. The accompanying table shows the exports for December and for the calendar year 1917 as compared with 1916.

The imports of iron and steel for December, 1917, show a heavy decline as compared with the same month of 1916, amounting to but 14,642 as against 44,142 tons. Reduced shipments of scrap are chiefly responsible for this shrinkage. Owing to the large imports in the early part of 1917, the total for the calendar year shows a small gain over 1916, the receipts aggregating 329,922 gross tons as compared with 319,589 tons in 1916. The accompanying table shows in detail the imports for December, 1916 and 1915, and for the two calendar years.

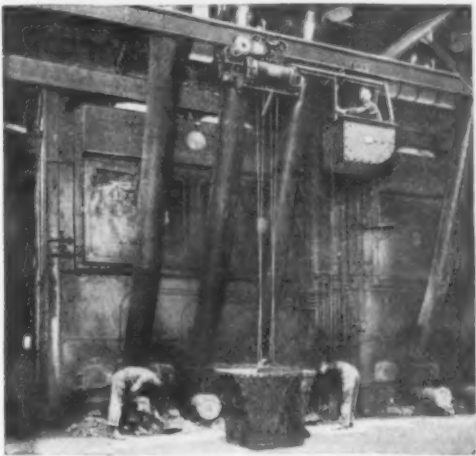
W. L. C.

The American Forge & Machine Co., Canton, Ohio, is erecting a steel building, 40 x 100 ft., to be used as a heat treating department. The building will be equipped with car type furnace, heat recording instruments and quenching tanks, thus securing the scientific treatment of all forgings. Testing machines of various types will also be installed, and it is hoped to have this heat treating department in operation about Feb. 10. The company states all the equipment has been bought.

Monorail Hoist for Handling Ashes

A monorail electric hoist running on the lower flange of an I-beam track and a bottom dumping bucket are employed in the boiler house of the Philadelphia Paper Co., Manayunk, Philadelphia, for handling approximately 30 tons of ashes every day. The ashes are pulled out every 6 hr. by two laborers who fill the buckets. The bucket which holds 1 1/4 cu. yd. is then raised by the 2-ton hoist which was supplied by the Link-Belt Co. The operation of the hoist is regulated by a man traveling in a trailer cage and the raising and lowering of the bucket is governed from the same point. All of the gears in the hoist are inclosed by housings and operate in oil.

The monorail track on which the hoist runs passes out from the boiler house over a railroad siding where the ashes are discharged into cars. In this connection it is emphasized that the hoist and bucket are very compact, and require but little headroom, thus making it advantageous for use where it is necessary to get a large bucket over the side of a high gondola car. The coal for the boilers is stored in a suspended bunker of



A Hoist Operating in Connection with an Over-head Monorail System Enables 30 Tons of Ashes to Be Disposed of Daily

steel which discharges into the bucket of the monorail hoist. From here it is carried on the overhead track to the hopper of the automatic stoker where the load is dumped.

Federal Legislation on Water-Power Developments

What legislation, if any, Congress might wisely pass for encouraging the development and conservation of the water-power resources of the United States is the subject of a vote now being taken by the Chamber of Commerce of the United States. A report of the Chamber's special committee on water-power development recommends that federal legislation encouraging the development of water powers should be at once enacted; that a separate act of Congress should not as at present be required for each development, but the authority to issue permits should be vested in some department or commission; that permits should be issued for a period of at least 50 years; that a toll should be imposed by the Government only on power developments on the public domain or benefited by head-water improvements maintained by the Government, etc. The report emphasizes that water-power developments are not exceedingly profitable undertakings earnestly sought by capital as a means of securing large returns on a small investment; that the initial cost of a steam plant is in general but one-half to one-fifth of a water-power plant of the same capacity.

The United States Stamping Co., Moundsville, W. Va., recently re-elected directors as follows: R. M. Gilleland, H. C. Ogden, E. L. Stone, H. E. Vance, A. M. Schenck, F. H. Blake, H. C. Pickering and J. M. Sanders.

Advances in Freight Rates Expected

Shippers Will Have Larger Bills to Pay—Excessive Demands Being Made by Labor—Railroad Bill Nearly Ready for Consideration by Both Houses

WASHINGTON, Feb. 5.—Experienced observers here having any degree of familiarity with railroad operations expect sharp advances in freight rates and, probably, passenger fares also in less than three months. They will be agreeably disappointed if the increases are put off longer than the beginning of May. The freight rate advances will be the price shippers of the country will pay for the privilege of having the transportation systems operated as part of the military machine. They will be one of the consequences of Governmental control of common carriers.

That freight rates would have been advanced to some extent even had the railroads remained under the control of their owners is altogether probable, but a greater return will have to be made to the carriers for the benefit of stockholders under Government control than they have been able to make for themselves. How much of the money derived from the increased rates will be spent in making additions to equipment or permanently improving roadbeds cannot be stated, but indications all point to very large disbursements on these accounts.

Estimates as to the amount of the probable rate increases run from \$300,000,000 to \$500,000,000; that is to say, if the maximum estimate is realized, the operating revenues of the roads will be raised from about \$3,500,000,000 to nearly \$4,000,000,000. On this basis, railroad employees, it is believed, will obtain about \$250,000,000 and railroad stockholders about \$150,000,000. The remaining \$100,000,000 will be disbursed for repairs and improvements. In addition to these sums to be derived from increased rates, the Government will probably be called upon to advance large sums for much needed equipment and betterments.

Will Need Many Millions

Some of the statisticians of the Interstate Commerce Commission have made rough unofficial estimates that at least \$200,000,000 will be needed to bring the income of railroad systems earning less than 6 per cent up to the point of acceptability. These estimates are based on the fact that the property investment of the railroads of the country as shown by the books of the Commission is \$17,000,000,000, in round figures, 6 per cent of which would be \$1,020,000,000. But there are railroads that have been making more than 6 per cent and, taking these into account, the disbursement will probably amount to at least \$1,035,000,000 or about \$15,000,000 more than 6 per cent on the property investment shown by the books of the Commission.

Demands of Labor

Railroad labor is watching these developments with keen interest. The Bolsheviks of Russia have caused the American public to smile because the councils of workmen and soldiers have demanded wage increases running from 25 to 40 per cent. These figures do not appear so extravagant, however, after examining the demands already filed with the Railroad Wage Commission which, if granted, would aggregate \$500,000,000, or about one-half the operating income secured by the roads in the fiscal year 1917. The telegraph operators have asked for a 40 per cent increase, but their spokesman has frankly admitted that this figure may have been suggested by the fact that the Government had seized the roads. Section hands, calling themselves "maintenance of way employees," have suggested a 60 per cent addition to their pay, on the ground that their work is exceptionally arduous and tends to shorten their lives; also because they are closely confined to their tasks. Train operatives will present their demands within a day or two. They are the railroad employees

who held up Congress and the Administration in 1916 and obtained a 20 per cent advance under a so-called eight-hour day regulation, secured with the leverage of a threat to deprive the country of food by allowing crops of perishables to rot.

Under private ownership, there seldom has been a wage contest between a railroad and its employees that has not resulted either in the defeat of the latter or in a compromise under which they have obtained not to exceed one-half their demands. In the dispute that resulted in the enactment of the Adamson law, the employees obtained 100 per cent of their demands through the surrender of the President and Congress. The shippers of the country and the general taxpayers who must now foot the bills will follow with interest the contest soon to begin before the Wage Commission.

The Administration's railroad bill, providing in detail for the Governmental control of the carriers, has been under consideration simultaneously in both House and Senate Interstate Commerce Committees during the past fortnight. Both drafts are now practically ready for the consideration of their respective houses. The Senate bill, as reported, retains the provision appropriating \$500,000,000 to be used as a revolving fund from which to pay any deficiencies that may arise in the management of the roads or in their compensation and to provide for additional facilities. Mr. McAdoo has referred to this as "merely a guaranty fund" which may not be expended but which the Director-General of Railroads should have authority to disburse if necessary. If the plans of the Administration to improve the facilities of the roads and generally to increase their efficiency are carried out it is more than likely that the guaranty fund or some other fund of equal size to be provided hereafter will be entirely absorbed.

W. L. C.

United States Steel and Carnegie Pension Funds

The seventh annual report, showing the operations for the past year of the United States Steel and Carnegie Pension Fund, indicates that during the year \$712,506.65 was distributed among retired employees of the United States Steel Corporation and its subsidiary companies. At the close of the year, there were 2933 beneficiaries to the fund. During the year, 241 persons were added to the rolls and 321 were discontinued through death. The average pension now paid is \$21.10 per month, an increase of 5 cents per month over the previous year. The minimum pension paid is \$12 per month, and the maximum \$100 per month. The average age of the pensioners is 65.42 years, and the average service period with the companies 29.99 years.

Including the disbursements for 1917, the total amount distributed through the Pension Fund during its seven years of operation is \$3,658,047.73. No part of this fund was contributed by the beneficiaries themselves, but all is derived from trust funds amounting to \$12,000,000 established by Andrew Carnegie and the United States Steel Corporation.

The total amount paid out to retired general and sales office employees was \$15,089.95, indicating that the workmen formerly employed in the Steel Corporation's mills and mines are very largely in the majority of beneficiaries under the Pension Fund.

The Commercial Steel Castings Co., Marion, Ohio, recently incorporated with a capital stock of \$150,000, will erect a foundry building, 50 x 175 ft., for the manufacture of acid open-hearth steel castings. It will require a crane ladle, grinding equipment and an open-hearth furnace.

CORRESPONDENCE

Standardizing Balance

To the Editor: A new standard is being proposed by the undersigned, that of balance, static and dynamic. Balance of both kinds can be measured, so why not establish some limits or tolerances, by which the balance can be judged and classed as good or poor?

Static balance is measured in ounce-inches; and, for bodies not over 150 lb. weight and whose journals are not over 3 in., the maximum allowance or permissible error should not exceed, say, 0.4 oz.-in. In actual practice this seems to lead to satisfactory results.

Dynamic balance, although due to a centrifugal couple (its presence or absence), should be measured not in units of moment, such as ounce-inches, but, more conveniently so, in inch-ounce-inches, or ounce-inches square. This eliminates the speed factor, immaterial in our case, and brings out more plainly the combination of the three factors to be dealt with: the weight of one of the heavy points, its radial distance from shaft, and its axial distance from the other weight; the combination of which two weights is the very essence of the couple in which we are interested.

The maximum limit or tolerance of such dynamic unbalance can be, say, 12 oz.-in.²; which leads to good results and at the same time does not mean undue decrease in production.

The quality of the article as regards balance should, of course, be absolutely independent of the type of the machine on which balancing is being done, and there is an easy way in which the machine can show that it either can hold its own or that it is not adequate to the requirements. Taking, for instance, a straight, ground, steel rod, and rotating it in the machine, we should observe no indications whatever on it; creating a static unbalance of the amount suggested above, we should observe a clear indication; putting the rod out of balance, dynamically, by such means as two suitable weights properly fastened on it, to the amount not exceeding the limit suggested above, we should be able clearly to observe it on the indicator of the machine.

Just what these tolerances should be is another matter; the values suggested by the undersigned are taken from his own laboratory practice and in his opinion should never be exceeded; but an exchange of opinions of others might even result in cutting them down.

The main object is to secure the indorsement of the best known people in the land, scientists and practical engineers, for the idea itself of standards of balance.

Philadelphia, Jan. 28.

N. W. AKIMOFF.

Effect of Striking Arc on Welded Steel

To the Editor: The writer is very much interested in tests reported in your issue of Jan. 24, made at the works of the Westinghouse company at East Pittsburgh, Pa., tending to show the effect of the electric arc on material adjacent to the weld.

The writer has taken an active interest in effects of this kind for a number of years, and was not aware that there was any belief current to the effect that material adjacent to the weld was injured by an arc of 60 volts, although it is generally admitted that it is possible to injure material that is deposited in the weld with an arc of 60 volts.

The effect of an arc upon the material adjacent to the weld is dependent upon all factors which determine the temperature of the metal at that point and the length of time that the metal is maintained at a high temperature. Arcs connected in series with a reactance produce a tremendous temperature rise at the moment of breaking the circuit, and it is arcs of this kind which possess the power to injure metal by the mere striking and breaking of the arc. It would be interesting to continue the investigations in series with which a reactor is connected and also to include pieces in which the metal deposited in the weld is part of the test piece.

Undoubtedly, metal deposited on the solid plate in

the form of a patch changes the structure of the steel as was evidenced by the decrease in elongation and reduction of area, as well as the increase in tensile strength. The writer has used this method for local heat treatment of welded joints, that is by depositing a layer of metal on top of the weld after it is completed, and then machining it off, with a result that the weld is stronger and the contraction strains practically eliminated.

OTIS ALLEN KENYON.

Electrical engineer, Arc Welding Machine Co., Inc.
New York, Feb. 2.

Japan's Heavy Imports of American Steel and Machinery

Unless a study is made of our export trade the extent to which it has grown is little realized, especially in lines outside of distinctly war material. Japan has been a very large buyer in American markets and her purchases include many commodities. In the steel and machinery markets the expansion of this trade has been phenomenal. An analysis of Government official figures brings out the following interesting table of exports to Japan of the principal machinery and steel commodities for the ten months ended Oct. 31, 1915 and 1917, showing the growth in those two years, and a comparison with the outgo in 1913:

Table of Principal Exports of Steel and Machinery to Japan

	Calendar Year 1913*	10 Months Ended Oct. 31, 1915	10 Months Ended Oct. 31, 1917
Metal-working machinery	.....	\$78,122	\$1,017,910
Sewing machines	.....	\$64,029	\$339,837
Wire nails, lb.	.....	9,856,226	18,739,213
Cast pipes and fittings, lb.	.....	9,549,765	8,757,144
Wrought pipes and fittings, lb.	.....	9,373,803	36,802,538
Steel rails, tons	20,820	3,050	50,649
Galvanized iron and steel sheets, lb.	.....	5,115,314	9,616,047
Steel plates, lb.	16,241,961	61,426,306	499,821,054
Steel sheets, lb.	.....	3,771,667	59,578,764
Structural iron and steel, tons	8,981	1,701	23,081
Tin plates, terne and taggers, lb.	509,245	14,538,438	42,063,218
Barb wire, lb.	.....	2,110,360	418,601
All other wire, lb.	.....	53,960,068	41,014,902

*In many cases the destination was not given in 1913.

While the increase over 1913 in each case is very large, that for the ten months of 1917 over the same ten months two years previous is striking in some cases. Especially marked is the increase in steel plates. Practically 500,000,000 lb. had been shipped to Japan up to Nov. 1, 1917, as compared with 61,426,306 lb. to Nov. 1, 1916. The combined exports to Japan of all kinds of sheets and plates were over 569,000,000 lb. to Nov. 1, 1917, as compared with over 70,000,000 lb. in the same period in 1915 and only 16,241,961 lb. for all of 1913. The absorption of tin plates by Japan is also a feature. The 42,000,000 lb. taken from the United States to Nov. 1, 1917, is three times the amount in the same ten months only two years previous and eighty times what it was in all of 1913. The expansion in structural steel again reflects Japan's industry in constructing ships. The growth in the quantity of cast and wrought pipes and fittings is interesting. Even in steel rails the purchases by Japan have been large by comparison—50,649 gross tons to Nov. 1, 1917, or two and one-half times what they were in all of 1913. They fell off decidedly in the 1915 period.

In metal-working machinery the expansion was thirteenfold in two years or from a total value of \$78,122 to \$1,017,910.

Comparing values, the figures are remarkable. In steel plates alone Japan took \$28,040,096 worth to Nov. 1, 1917, as compared with a valuation to Nov. 1, 1915, of only \$1,141,548. The total valuation of the exports of manufactures of iron and steel to Japan for the first ten months of 1915 was \$4,418,377, against \$46,550,291 worth in the same ten months in 1917.

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, Advertising Manager

Published Every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

W. H. Taylor, Pres. and Treas.

Charles G. Phillips, Vice-Pres.

Fritz J. Frank, Secretary

M. C. Robbins, Gen. Mgr.

Owned by the United Publishers Corporation, 243 West 39th Street, New York. H. M. Swetland, Pres. Chas. G. Phillips, Vice-Pres. W. H. Taylor, Treas. A. C. Pearson, Secy.

Trust Bldg. Cleveland: Guardian Bldg. Cincinnati: Mercantile Library Bldg. San Francisco: 320 Market Street.

BRANCH OFFICES—Chicago: Otis Bldg. Pittsburgh: Park Bldg. Boston: Equitable Bldg. Philadelphia: Real Estate

Subscription Price: United States and Mexico, \$5.00 per year; single copy, 20 cents; to Canada, \$7.50 per year; to other foreign countries, \$10.00 per year.

Entered as second class matter, June 18, 1879, at the Post Office at New York, New York, under the Act of March 3, 1879.

Prospects for Steel Mill Operation

When steel, a great war essential, is produced only at the rate of about 50 per cent of capacity, the prospects for better operation of the mills naturally are canvassed. The restriction in output through physical conditions is altogether unprecedented. Rarely, indeed, have the mills been forced to operate at as low a rate as 90 per cent when they had a sufficiency of orders, and only once—toward the close of 1914—has lack of orders reduced their operations to a rate below 50 per cent.

The present restriction is due largely or wholly to lack of transportation. Labor shortage might develop if the mills endeavored to operate at capacity. It is not at all certain that it would. The cost sheets of mills indicate heavy employment per ton of output as tonnage decreases. In the present congestion a great deal of labor is engaged simply through the fact that there is not an orderly movement of material from finishing rolls or other finishing departments to the railroad car. If labor shortage were developed it would not appear until the mills had approached very nearly to a rate of operating at capacity.

Of raw material at the source there is no lack. There is ample ore and coking coal in the ground. The ore-mining capacity is ample. So is the coke-making capacity. The beehive ovens produced 35,464,224 tons of coke in 1916, their record year, while by-product ovens produced about 22,600,000 tons in 1917, and their capacity within a very few months will be at least 25,000,000 tons, making the total coke capacity in excess of 60,000,000 tons. In 1916 there was produced 54,533,585 tons of coke and 39,434,797 tons of pig iron. By the rule of three, the iron industry's share of the coke capacity would compass the production of 44,000,000 tons of pig iron, which is in excess of the blast-furnace capacity.

The relation between blast-furnace capacity and steel-mill capacity is an unusual one. Judged by the data of previous years, there is too much steel-making capacity in proportion to blast-furnace capacity, but at this particular time the proportion of pig iron required for other purposes than steel-making is abnormally light, and it may be that full production of pig iron could be accompanied by full operation of the steel works. The supply of old ma-

terial is very light, but the production of works scrap is unusually large.

It is clear, at any rate, that the chief bar to full operation of the blast furnaces and steel mills is the inadequacy of transportation. Can the railroads be put in position to serve the industry fully? Given an opportunity to operate, the railroads have a far larger capacity than they have ever exercised hitherto. In the fiscal year ended June 30, 1916, their freight movement was 343 billion ton-miles, or much more than in any preceding year. In the five months April to August, 1917, they showed a movement at the rate of 425 billion ton-miles. Operated as one system under Government auspices, they are expected to secure still better results from the physical equipment. The breakdown has been due chiefly to the weather. A large number of locomotives is to be furnished during the next few weeks. Shortage of labor has been a great complaint with the railroads, but the practical fact is that with good weather, congestion relieved, and more locomotives, the same number of men can produce much better results.

There is distinctly in prospect a capacity to move a very great deal more freight than ever before. How much of the capacity does the iron and steel industry require? From the latest statistics available the following statement is compiled, showing roughly the distribution of freight, in point of weight, carried by the railroads:

	Per Cent
Products of agriculture	11.3
Products of animals	2.7
Coal	34.7
Coke	2.4
Stone, sand, etc.....	8.9
Other mine products.....	9.4
Products of forests	9.4
Manufactures, etc.	21.2
Total	100.0

This showing is not by any means representative of the ton-mileage movement, for the reason that some products move great distances, others but short distances. Large consumers of coal locate close to the mine. The products of agriculture, on the other hand, move great distances. For all commodities the average distance traveled was 275 miles. The coal movement probably averaged less than 100 miles.

Under war conditions there are various changes

in the alignment. Cross movements in coal are being reduced, whereby a larger tonnage can be moved with no greater ton-mileage. The products of agriculture will move a greater distance, on an average, and likewise the products of animals. The movement of stone, sand, etc., is greatly reduced. The movement of many manufactures will be reduced. Without further elaboration it seems fair to indulge the expectation that if the capacity of the railroads is expanded in accordance with the hopes entertained the share of the total to which the iron and steel industry would rightfully be entitled would be amply sufficient to move its raw, intermediate and finished materials; or, in other words, that the iron and steel industry is in the same boat with the railroads. If they can operate satisfactorily so can the iron and steel industry.

Car Building Should Be Pushed

Back of every need in the present critical situation in fuel and transportation is that of increasing output of locomotives and cars. Freight must move overland before it can be shipped overseas, and with every ship launched demands on the railroads grow. Locomotive shops are working to capacity, but if they worked steadily for a year on domestic orders they could not make up the existing shortage of motive power. As regards freight cars the situation is almost as serious.

The United States entered the war ten months ago with about 2,500,000 freight cars in use, or 250,000 less than it should have had. Since then the railroads, unable to finance even their upkeep, have been forced to neglect minor repairs, and, as is well known, have gone steadily from bad to worse. In 1917 car builders delivered to domestic railroads only 99,500 of the 200,000 cars needed each year to make up for wear and tear and provide for normal growth of traffic, falling short by 50,000 of the average of the past five years. Cars ordered for use in this country and undelivered Jan. 1 amounted to 35,000, which the car builders normally could dispose of in six weeks' time. The 50,000 light cars now on order for foreign service need be completed only as fast as shipping is provided to carry them.

If car manufacturers were now to be loaded up with orders, delivery could not begin before late spring. It is already too late to meet fully the demands next summer's military efforts will make upon the railroads, and none too early to prepare to meet the requirements of another winter. With business unimpeded, from 60 to 90 days must elapse from receipt of orders before delivery of cars can begin.

The car companies can deliver 25,000 cars per month. They should be set at the task without delay and kept going at full capacity until there are sufficient cars to handle traffic. The railroad bill now under consideration at Washington is the proper vehicle through which to accomplish this, and it should embody a schedule that will definitely preempt the capacity available not only for next fall and winter, but also for 1919. The steel trade for years has urged that the railroads take advantage of periods of low demand and consequently of low prices for steel to place orders for equipment

sure to be needed sorely on the next ensuing rise. The reply has always been that when steel was low railroad financing was high-priced. Thus for years the largest consumer of steel has done its heaviest buying when steel was highest and has been the creature rather than in any degree the maker of business conditions. All this is changed, with the credit of the Government behind the railroads, and now with all the urgency of war activities demanding haste. The question of the availability of steel need not be too seriously raised, especially in view of later and reduced estimates which put the ship-building possibilities of the year at 3,000,000 tons.

To Increase the Scrap Supply

Stories come across the Atlantic of the remarkable efforts made by Germany to maintain a supply of iron and steel scrap sufficient for her steel plants and rolling mills. Church bells, door knobs and many other articles more valuable as scrap metal than in their ordinary service have been sold to the junkman, who has been stimulated to extraordinary effort in gathering scrap by the War Metals Committee of the empire. There is good ground for the belief that Germany would have been unequal to the task of furnishing sufficient steel products for the war if unusual methods had not been adopted for accumulating scrap.

The old-material situation in this country is a matter well worth attention in view of Germany's experience. While no actual shortage has developed here, the possibility is recognized and has been sufficient to have careful attention from the Committee on Steel and Steel Products of the American Iron and Steel Institute. Various factors, including the elements, have combined to create a scarcity of scrap; but whether it is more apparent than real and will disappear on a nearer approach to normal transportation conditions is not clear.

Constantly facing a shortage of pig iron, the steel mills of the country have made extraordinary demands for scrap. For a time it was forthcoming in fairly liberal quantities. Then the railroad congestion and severe weather made it almost impossible to ship. Last week the trade in old materials all over the country had been reduced to a state of absolute inactivity.

In seeking for means of bringing about a better supply the Committee on Steel and Steel Products decided that a committee consisting of producers, distributors and consumers would be able to handle the situation more effectively than the old committee, which consisted exclusively of dealers. The selections have been made with great care, the representatives of the three branches of the trade being men of influence in their respective fields. Their task will be to co-operate in such a way as to persuade producers, dealers and distributors that it is a patriotic duty to increase the available scrap supply so that steel production may not suffer.

One of the very important features of the campaign which is now in full force for recruiting an army of 250,000 men to meet present and future needs of the shipyards of the United States is the

provision that each volunteer worker enrolled will receive a badge showing that he has offered his service to his country. It is entirely proper to grant this recognition to men who are willing to serve their country as workmen and to indicate that men can be patriotic in that kind of service as well as in fighting. Many men having a patriotic spirit have felt a great deal of reluctance about going into the service of the country in any way except as fighters, and it is well that the Department of Labor thus recognizes the fitness of honoring men willing to serve in a way that is not spectacular, but is absolutely necessary in order to win the war.

Daylight Saving in War Time

The daylight-saving bill introduced by Senator Calder and passed by the Senate last fall should be promptly approved by the House. Even in ordinary times very strong arguments could be made for such a measure, which would result in large saving of fuel, give additional time for recreation, encourage home gardening and contribute in many ways to the health and happiness of workers in offices and shops. The Boston Chamber of Commerce has drawn the attention of Congress to the fact that the report of the English Parliamentary Commission, which investigated the practical operation of the daylight saving plan in Great Britain, shows that there has been an important and highly significant decrease in the percentage of accidents as the result of the change. Statistics gathered by the commission demonstrate beyond question that a preponderating percentage of accidents in manufacturing establishments occurs during the latter part of the day and is traceable to fatigue and poor lighting. The substitution of an hour in the early morning for one in the late afternoon, thus shutting down before the sunlight wanes, has eliminated both these causes to a marked extent, in addition to the saving of fuel by removing the necessity for artificial light.

If the above statements are true, and daylight saving is important in time of peace, it is much more important in time of war, and it is entirely proper that the Calder bill be passed as a war measure.

The only argument made against the bill is that it is likely to cause confusion; but this has not proved to be the case to any great extent in important industrial centers where similar movements have succeeded. When, a few years ago, the city of Cleveland set its clocks an hour ahead, the life of the city was quickly adjusted to the new time, which soon became so popular that the sentiment in favor of its retention throughout the year was overwhelming, and Detroit and other cities followed in adopting eastern time. The pending Calder bill provides that the new method shall be in vogue for only five months, beginning in April, but it could safely be extended so as to provide for starting and finishing the day one hour earlier for seven months, restoring usual time from Oct. 1 to March 1. Many cities located nearly midway in the standard-time zones could avoid the double change in the twelve-month and get the advantage of more daylight hours for work by going permanently to faster time.

Japan's purchases of iron and steel and machinery from the United States have grown to vast pro-

portions as the war has progressed. To Nov. 1, 1917, as shown by the statistics given on another page, Japan has taken over half of our steel plate exports or more than 200,000 gross tons; her imports of American tin plates had expanded 80-fold since 1913 or from 509,245 pounds in that year to over 42,000,000 pounds in the first ten months of 1917; her receipts of steel rails had grown two and a half times since 1913, and in other commodities the expansion had been over two-fold in two years. The buying of American metal-working machinery had expanded 13-fold in two years. Of a total export valuation of \$1,025,623,521 for our exports of manufactures of iron and steel to Nov. 1, 1917, Japan is credited, where destinations are stipulated, with \$46,550,291 worth. The amount was considerably larger than this because in many commodities, such as pig iron and semi-finished steel, destinations are not given.

Our Large Trade Balance

While 1917 established a new calendar year record for a favorable balance in our foreign trade, that fact does not indicate a continued and progressive increase. The first four months of 1916 had shown much smaller balances than the remainder of the year, and if comparison is made between the year 1917 and the last eight months of 1916 a slight decrease is seen, rather than an increase.

On the whole, however, there is nothing in the latest figures to indicate that our foreign trade is falling off in any respect, in imports, in exports, or in the favorable balance. The suggestion of preceding months has been confirmed by the December statistics, that month making a particularly favorable showing.

The figures for December, 1917, are as follows: Imports, \$228,000,000; exports, \$589,000,000; balance, \$361,000,000. How favorable these figures are is most readily observed by noting the smallness of the number of months for which larger figures were reported. The December imports fell short only of those in May and June, 1916, and January, March, April, May, June, August and September, 1917—nine months. The December exports were exceeded only in January, 1917, and the December trade balance was exceeded only in that month also.

That there was an increase in the value of the exports in December, in relation to quantity, can hardly be doubted, but there could have been no such increase in value per unit as to account for the entire increase, to explain why the December exports were \$589,000,000 as compared with an average of \$440,000,000 in the preceding July, August and September, the lowest three-month exports since the first three months of 1916. The December export statistics are particularly interesting in view of the accumulation of vessels at the seaboard recently brought to light and already largely remedied. In view of this vessel situation it is quite possible January has a very remarkable showing in store.

The calendar year showing of our merchandise trade is as follows:

	Imports	Exports	Balance
1914.....	\$1,789,276,001	\$2,113,624,050	\$324,348,049
1915.....	1,778,596,695	3,554,670,847	1,776,074,152
1916.....	2,391,654,335	5,481,423,589	3,089,769,254
1917.....	2,952,000,000	6,226,000,000	3,274,000,000

The showing of the past three years is fictitious in certain respects, or rather the merchandise balances shown represent more than the amount by which the country has grown richer. In the first place the year 1914, with its small balance, when fully \$500,000,000 a year had been needed to settle the unseen balance, which was always against us, left a debit balance for 1915 to settle. Then there have been freights, and at very high rates, to be paid foreign vessel owners upon the great bulk of our imports, which are valued at the foreign port for statistical purposes. The apparent balance for the past three calendar years totals a trifle over eight billion dollars, and a rough estimate would be that six billion was left to be settled in various ways. First, there has been a large influx of gold, a trifle over a billion. Next, there has been a security movement, first the return of American securities held abroad, then the flotation here of loans by foreign governments, of which the Anglo-French issue of half a billion was the largest single item. Finally there have been the direct loans of the American Government to its Allies. This item of course will grow steadily during the remainder of the war and will be the chief means of settling of merchandise trade balances. Of American securities only a small volume is left abroad, free to be sold here. Of gold we already have as much as is to be expected.

While the merchandise balance has been settled in securities, the major portion of the securities will be such as are to be repaid later. The eventual settlement will be through merchandise or through American investments abroad. To regulate the former a careful system of tariffs will have to be devised, while as to the latter American investors themselves will have to be careful. It is easy to foresee that conditions may be such as to prompt the development of all sorts of unsound schemes to lure the American investor.

A representative of the United States Food Administration, who returned to the United States within the last two weeks after a visit to many strategic points on the western front, made the public statement last week that over 18,000,000 shells were fired at the Germans during the Verdun offensive in 1916 and that 3,200,000 French soldiers passed through that little town, all of whom saw action. It is difficult to estimate the amount of steel represented by these 18,000,000 shells. They were of all calibers and worked down from steel originally in larger bulk. Figures on another page show that steel in unfinished form and as steel bars shipped from the United States and Great Britain for the 41 months of the war to Jan. 1, 1918, has attained the stupendous total of over 7,000,000 gross tons. Of this amount the United States contributed nearly 6,000,000 tons. But these figures represent only a fraction of the actual, since from the United States, Canada and Great Britain and from the steel mills of France itself there has flowed a steady stream of finished shells of which there is no record in steel tonnage. The rain of steel and copper from both sides on the western front has been a deluge and far the larger part of it will never be recovered.

CONTENTS

Developing the Community Interest.....	369
Strict Regulation of Explosives.....	372
Powder Plants for War Department.....	372
Wages for British Puddlers.....	372
An Aluminum Alloy from a German Zeppelin.....	373
Manganese in Slags and Its Incorporation in Steel.....	373
Tremendous Cost of Hog Island Plant.....	374
Plates for Canadian Ships.....	376
Workmen's Compensation.....	376
Gas-Fired Shipyard Furnace.....	377
Limited Free Trade.....	378
Volatilization of Phosphorus from 50 Per Cent Ferro-silicon	378
Heating of Coal in Piles.....	379
Reducing the Cost of Handling Scrap.....	379
Classification of Foundry Literature.....	379
British and American Exports After the War.....	390
Larger Skilled Labor Supply.....	382
Vocational Education Meeting in Philadelphia.....	382
New Multi-Spindle Machines.....	383
Russia's Decline in Iron Output.....	384
Thrift Stamps Given to Employees.....	384
Inter-Mountain Rate Case.....	384
Salvaging Pig Iron With Lifting Magnet.....	385
City Gas Plants to Recover Toluol.....	385
Gas Producer with Floating Agitator.....	385
A New Chinese Iron and Steel Plant.....	386
Koppers Plant at St. Paul Placed in Operation.....	388
The Erosion of Guns.....	389
Record Breaking Exports of Iron and Steel.....	390
Monorail Hoist for Handling Ashes.....	391
Federal Legislation on Water-Power Developments.....	391
Advances in Freight Rates Expected.....	392
United States Steel and Carnegie Pension Funds.....	392
Correspondence	393
Japan's Heavy Imports of American Steel and Machinery.....	393
Editorial:	
Prospects for Steel Mill Operation.....	394
Car Building Should Be Pushed.....	395
To Increase the Scrap Supply.....	395
Daylight Saving in War Time.....	396
Our Large Trade Balance.....	396
Greater Loss in Output.....	398
Blast Furnace Notes.....	399
Iron and Steel Markets.....	400
Munition Steel Exports.....	411
Sharon Steel Hoop Co. Buys Mary Furnace.....	411
New Railroad Shops.....	411
Metal Markets.....	412
Prices Finished Iron and Steel f.o.b. Pittsburgh.....	413
Iron and Industrial Stocks.....	414
Lead Output and Exports in 1917.....	415
Personal	416
Coke Production Falls to the Lowest.....	417
Obituary	418
Frequency of Accidents.....	418
Germany's Desires for Foreign Ores.....	419
Pneumatic Drilling Machine for Light Service.....	419
Ferromanganese Imports for December and for 1917.....	419
Accuracy versus Precision.....	419
Mechanical Engineers' Spring Meeting.....	419
Favor American Electrical Goods.....	419
Industrial Housing	420
Association of Iron and Steel Electrical Engineers.....	420
New Scrap Committee.....	421
Test of Boiler Fired with Pulverized Coal.....	421
Shut-Downs to Continue.....	421
Graphite Output in 1917.....	421
South Africa's First Electric Steel Furnace Is Unique.....	422
Making Steel With Two Converters and an Electric Furnace	422
Large Orders for Locomotives.....	422
Defeat of War Cabinet Bill Predicted.....	423
Manganese Ore Imports a Record in 1917.....	423
Steel Turnings and the Electric Furnace.....	424
Electrical Machinery Developments.....	424
British Steel Products in the Far East.....	424
Book Reviews.....	425
Keeping the Men in France Posted.....	425
Machinery Markets and News of the Works.....	426
New Trade Publications.....	434

GREATER LOSS IN OUTPUT

Decline of About 1350 Tons Daily

Chicago District Falls Off 43 Per Cent—Pittsburgh Nearly 20 Per Cent

Pig-iron production was cut down more severely in January than in December, the loss in daily output the past month being 15,198 tons, as against 13,862 tons in December. Only 77,799 tons per day was made in January, as compared with 92,997 in December and 106,859 in November. The net loss in active stacks was only 11 in January, as against 24 the preceding month, 23 being blown out and 11 put in blast.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from December, 1916, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons			
	Steel Works	Merchant	Total
January, 1917	72,394	29,349	101,643
February	65,250	29,193	94,473
March	73,731	31,182	104,863
April	79,031	32,134	111,165
May	77,561	32,677	110,238
June	76,805	32,197	109,002
July	76,440	31,380	107,820
August	71,436	33,336	104,772
September	73,290	31,175	104,465
October	76,664	29,886	106,550
November	77,135	29,724	106,859
December	66,605	26,392	92,997
January	55,662	22,137	77,799

Production of Steel Companies

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of steel-making iron month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons			
	Pig, total production		
	1916	1917	1918
Jan.	2,251,035	2,244,203	1,725,513
Feb.	2,183,845	1,829,846	2,387,777
Mar.	2,365,116	2,285,430	29,388
Apr.	2,316,768	2,370,937	31,862
May	2,408,890	2,404,380	35,844
June	2,295,784	2,304,155	38,597
July	2,306,303	2,369,630	31,353
Aug.	2,313,122	2,214,513	33,338
Sept.	2,309,710	2,198,705	29,451
Oct.	2,530,806	2,376,589	34,566
Nov.	2,404,210	2,314,857	44,975
Dec.	2,294,620	2,064,757	43,470

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces in December and the three months preceding:

Monthly Pig-Iron Production—Gross Tons				
	Oct. (31 days)	Nov. (30 days)	Dec. (31 days)	Jan. (31 days)
New York	202,939	188,760	175,999	168,467
New Jersey	27,397	28,205	19,495	18,296
Lehigh Valley	117,523	110,758	106,760	110,285
Schuylkill Valley	80,478	80,121	60,949	41,913
Lower Susquehanna and Lebanon Valley	90,386	91,022	69,228	49,089
Pittsburgh district	666,731	663,909	619,870	500,497
Shenango Valley	161,615	148,617	133,480	113,531
Western Pennsylvania	218,814	203,256	184,520	150,710
Maryland, Virginia and Kentucky	100,446	93,653	81,480	79,433
Wheeling district	122,066	112,685	86,621	82,752
Mahoning Valley	316,906	274,788	247,191	232,337
Central and Northern Ohio	275,996	266,718	230,575	204,527
Hock. Val., Hang. Rk. & S. W. Ohio	64,061	66,334	51,350	53,102
Chicago district	455,045	481,537	432,028	247,702
Mich., Minn., Mo., Wis. Col. and Wash.	117,397	112,266	113,350	112,225
Alabama	260,469	251,694	237,227	219,167
Tennessee and Ga.	24,769	31,471	32,795	27,735
Total	3,303,038	3,205,794	2,882,918	2,411,768

Capacity in Blast

The following table shows the number of furnaces in blast Feb. 1 in the different districts, also the number and daily capacity in gross tons of furnaces in blast Jan. 1. For the first time, we omit estimates of

capacity in blast by districts at the beginning of the new production month. Conditions are so unprecedentedly abnormal owing to transportation and fuel breakdowns that no approximation to the probable average performance of the furnaces in February can be made:

Coke and Anthracite Furnaces in Blast

Location of furnaces	Total number of stacks	Feb. 1		Jan. 1	
		Number in blast	Capacity per day	Number in blast	Capacity per day
New York:					
Buffalo	19	17	.....	18	4,979
Other New York	4	2	.....	3	532
New Jersey	4	4	.....	4	778
Ferro	1	1	.....	1	23
Pennsylvania:					
Lehigh Valley	21	12	.....	14	3,387
Spiegel	2	2	.....	2	191
Schuylkill Valley	13	7	.....	7	1,762
Spiegel	1	1	.....	1	61
Lower Susquehanna	8	4	.....	6	1,950
Spiegel	2	2	.....	2	76
Lebanon Valley	8	2	.....	5	491
Ferro and spiegel	3	3	.....	1	40
Pittsburgh dist.	53	43	.....	45	19,450
Ferro and spiegel	4	2	.....	2	251
Shenango Valley	19	15	.....	14	4,140
Western Pa.	25	19	.....	21	5,756
Ferro and spiegel	3	2	.....	1	77
Maryland	4	3	.....	1	340
Wheeling district	14	10	.....	9	2,330
Ohio:					
Mahoning Val.	26	20	.....	21	8,196
Central and Northern	26	19	.....	20	7,874
Hocking Val., Hang. Rock & S. W. Ohio	17	14	.....	15	1,845
Illinois and Ind.	38	29	.....	29	13,962
Ferro	1	1	.....	1	63
Michigan, Wis. & Minn.	12	10	.....	10	2,499
Colorado, Mo., & Wash.	7	4	.....	4	1,096
Ferro	1	.....	.....	.....	.....
The South:					
Virginia	16	13	.....	13	1,332
Ferro	3	2	.....	2	79
Kentucky	7	4	.....	5	1,217
Alabama	37	33	.....	32	7,665
Tenn. & Georgia	16	10	.....	11	1,058
Total	415	310	.....	321	93,500

The Record of Production

Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1913—Gross Tons					
	1914	1915	1916	1917	1918
Jan.	1,885,054	1,601,421	3,185,121	3,150,938	2,411,768
Feb.	1,888,670	1,674,771	3,087,212	2,645,247	.....
Mar.	2,347,867	2,063,834	3,337,691	3,251,352	.....
Apr.	2,269,655	2,116,494	3,227,768	3,234,960	.....
May	2,092,686	2,263,470	3,361,073	3,417,340	.....
June	1,917,783	2,380,827	3,211,588	3,270,055	.....
July	1,957,645	2,563,420	3,224,513	3,342,438	.....
Aug.	1,985,261	2,779,647	3,203,713	3,247,947	.....
Sept.	1,882,577	2,852,561	3,202,366	3,133,954	.....
Oct.	1,778,186	3,125,491	3,508,849	3,303,038	.....
Nov.	1,518,316	3,037,398	3,311,811	3,205,794	.....
Dec.	1,515,752	3,203,322	3,178,651	2,882,918	.....

Total, yr*... 23,049,752 29,662,566 39,039,356 38,185,981

*These totals do not include charcoal pig iron. The 1917 production of this iron is estimated at 400,000 tons.

The figures for daily average production, beginning January, 1910, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1910—Gross Tons									
	1911	1912	1913	1914	1915	1916	1917	1918	
Jan.	56,752	66,384	90,172	60,808	51,659	102,746	101,643	77,799	
Feb.	64,090	72,442	92,369	67,453	59,813	106,456	94,473		
Mar.	70,036	77,591	89,147	75,738	66,575	107,667	104,882		
Apr.	68,836	79,181	91,759	75,665	70,550	107,592	111,165		
May	61,079	81,051	91,039	67,506	73,015	108,422	110,238		
June	59,585	81,358	87,619	63,916	79,361	107,053	109,002		
July	57,341	77,738	82,601	63,150	82,691	104,017	107,820		
Aug.	62,150	81,046	82,057	64,363	89,666	103,346	104,772		
Sept.	65,903	82,128	83,531	62,753	95,085	106,745	104,465		
Oct.	67,811	86,722	82,133	57,361	100,822	113,189	106,550		
Nov.	66,648	87,697	74,453	50,611	101,244	110,394	106,859		
Dec.	65,912	89,766	63,987	48,896	103,333	102,537	92,997		

Among the furnaces blown in in January were one Crane in the Lehigh Valley, one Worth in the Schuylkill Valley, one Edgar Thomson in the Pittsburgh district, one Shenango, Marshall in western Pennsylvania, two Maryland stacks, one Bellaire in the Wheeling district, one Hubbard in the Mahoning Valley, Franklin furnace in Ohio, Irondale in Washington and one Ensley in Alabama.

The list of furnaces blown out last month includes a Buffalo stack, Macungie and both Lock Ridge in the Lehigh Valley, Topton in the Schuylkill Valley, two Steelton in the Lower Susquehanna Valley, Lebanon

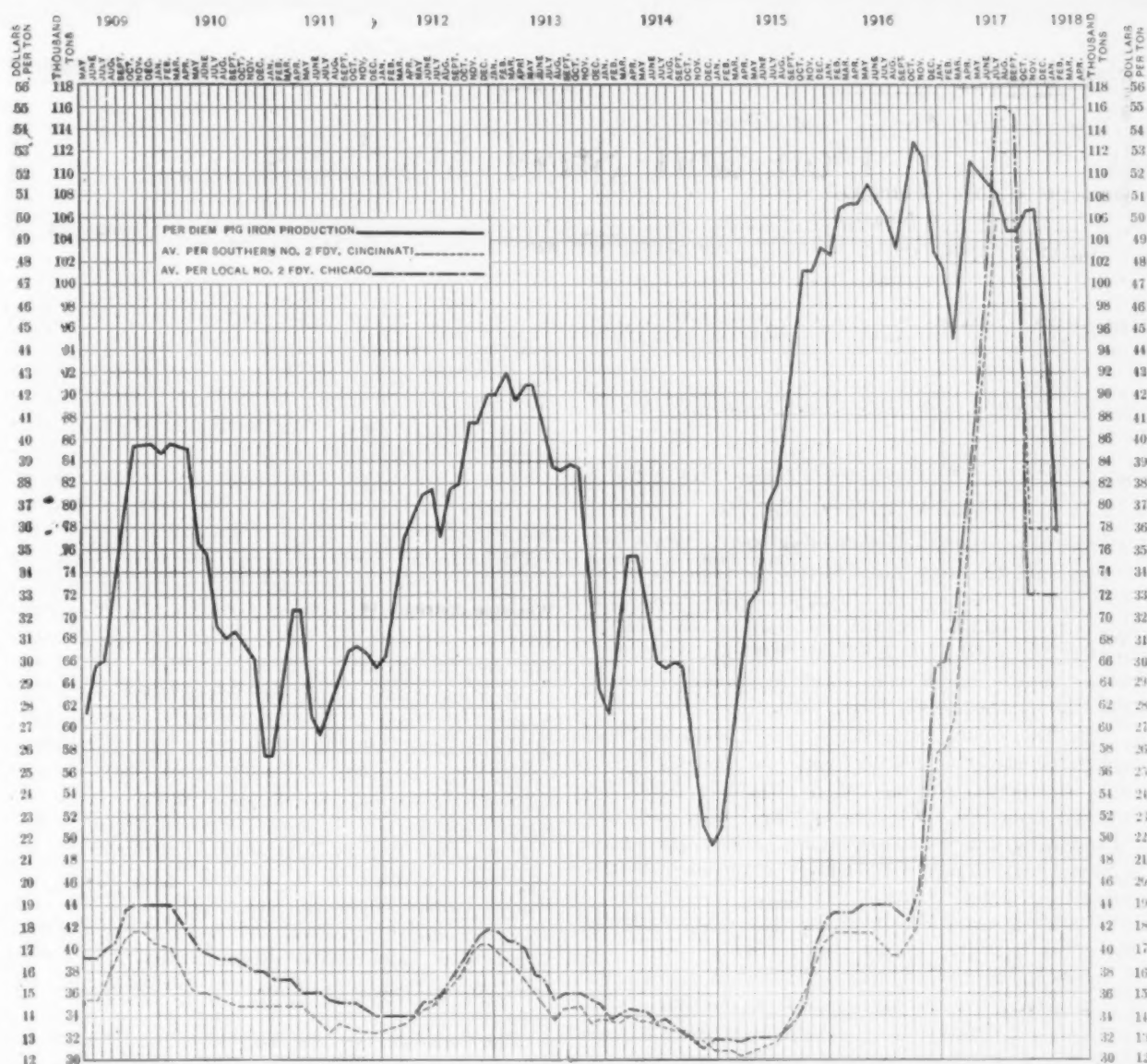


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from May 1, 1909, to Feb. 1, 1918; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

Valley furnace, two Carrie, two Duquesne and one Eliza in the Pittsburgh district, two Johnstown in western Pennsylvania, one Grand Rivers in Kentucky, McKeefrey and one Ohio in the Mahoning Valley, one Central and one National Tube in Ohio, and Rome in Georgia.

Diagram of Pig-Iron Production and Prices

The fluctuations in pig-iron production from May, 1909, to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production by months of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of THE IRON AGE.

The Production Division of the Aviation Section of the United States Signal Corps has opened offices in the Union Building, 1836 Euclid Avenue, Cleveland. From these offices the officers in charge will direct the manufacture of airplane parts and airplanes in the Central West. The Cleveland headquarters will be known officially as the Equipment Division of the Finance and Approval Section of the Aviation Section of the United States Signal Corps.

The Nagle Corliss Engine Works, Erie, Pa., has secured representation in San Francisco with the Vincent Whitney Co., Hearst Building.

Blast Furnace Notes

The Shenango Furnace Co. has blown out its No. 4 furnace at Sharpsville, Pa., on account of coke shortage. The No. 1 and No. 3 stacks are in blast, but with reduced output on account of bad quality of coke.

Hannah blast furnace of the Republic Iron & Steel Co. at Youngstown, Ohio, has been blown in after being relined and repaired.

The Bird Coal & Iron Co. still has under way the reconstruction work at Talladega, Ala., furnace begun several months ago. No date has yet been set for the blowing in of the furnace.

The Birmingham Trussville Iron Co. has Trussville, Ala., furnace ready for blast, after extensive improvements, but is waiting on the accumulation of a stock of coke.

The Nova Scotia Steel & Coal Co. is extending its operations at Sydney Mines, N. S., both in the production of steel and coal. It has just touched on the fringe of two square miles of submarine territory acquired under lease from the Dominion Coal Co. about four years ago. In order to work this new territory, the company will lay double tracks so that when a loaded train is ascending, another train of empty boxes can return to the working face. These big operations will be in full swing when the shipping season opens. Simultaneously work is progressing on the construction of a new steel bank-head for the handling of the product as taken from the mine. At the company's steel plant, a 250-ton blast furnace has recently been completed.

Iron and Steel Markets

SHARP PIG-IRON DECREASE

Steel Works Output About 50 per Cent

Costs Going Up Rapidly—Serious Scarcity of Low-Phosphorus Pig Iron

The pig-iron statistics for January give a measure of what the steel industry has suffered from the unparalleled weather and transportation conditions of the past month. Output fell to 2,411,768 tons, or 77,799 tons a day, against 2,882,918 tons in December, or 92,997 tons a day. January production was thus the smallest since May, 1915.

On Feb. 1 the number of active furnaces was 310, while on Jan. 1 it was 321, and on Dec. 1 345. How repeated bankings have crippled operations appears from the fact that in May, 1915, only 200 furnaces were at work to produce 73,015 tons a day, whereas last month it took an average of 315 furnaces to produce 77,799 tons a day.

To-day's situation is much more discouraging than the January figures show. Severe cold suddenly swept down this week on the Middle West, the heart of the iron and steel-producing section of the country, and for the first six days of February pig-iron production has probably been at less than 50 per cent of capacity. In January it was at the yearly rate of 28,700,000 tons, while the total for 1917 was about 38,600,000 tons. To-day the rate is probably under 22,000,000 tons a year.

It is quite certain that more furnaces in the Pittsburgh and Youngstown districts will bank this week. No cars were loaded with Connellsville coke on Tuesday, and the movement of bituminous coal to manufacturing plants in the week has been not far from 40 per cent of normal.

The steel industry of the country, according to the best data obtainable, is operating on a 50 per cent basis, and some plants at no more than 25 per cent. No decided improvement is to be expected for several weeks, so serious is the derangement of every part of the machinery of transportation, both in raw and finished materials. Producers will be many days working out of the glut of their own output, which now prevents any measurable increase in rolling-mill operations. At some plants the situation is simply chaotic.

Costs have advanced prodigiously under the cumulative handicaps in every part of the industry, and the showing in this respect, when iron and steel prices are officially considered, in March, will argue even more strongly against downward revision than the cost figures canvassed at Washington in December. Predictions of smaller pig-iron and steel production in 1918 than in 1917 have already appeared.

Operations have so absorbed the entire trade that buying and selling have become almost negligi-

ble so far as finished steel is concerned. With the downward revision of shipbuilding expectations for the year, the ability of plate mills to supply all the steel needed is no longer in question. Plates should be available for any program of car building likely to receive Government backing.

The Government figures largely in all current estimates in structural steel. The number of portable hangars bid on for France is about 2000 and the Allies may contract for 1050 in addition. In tin plate, interest attaches to a meeting held at Pittsburgh, Jan. 31, which arranged for a full exhibit of orders on the books as well as of tin plate bars contracted for by the rolling mills.

A development affecting the business of export houses is causing them some concern. Foreign purchases not for Government account have been unrestricted as to price, but they have been hard to place owing to scarcity of vessel space. Now, apparently at the suggestion of Washington, considerable general French and possibly British buying may be put through as defense material by the foreign commissions at the Capital. While bottoms may thus be insured, the so-called Government prices will undoubtedly obtain. Steel and equipment for a French railroad may be placed in this way.

The scarcity of low-phosphorus pig iron in its bearing on war work is one of the chief factors in the entire situation and has assumed national importance. Makers of ordnance have been obliged to cut down production of acid steel needed for gun carriages, and unusual measures have been taken to increase the supply of ore for blast furnaces operating on low-phosphorus iron.

Chicago has led in pig iron buying, transactions in basic alone amounting to 75,000 tons, and the leading merchant interest there has sold about half its expected output for the last six months of the year.

Pittsburgh

PITTSBURGH, Feb. 5—(By Wire).

Pittsburgh has been in the grip of intense cold, the thermometer for several days registering about 10 deg. below zero, with the result that the railroad congestion is now worse than it has been at any time and little betterment is looked for until we have several weeks of mild weather. The supply of cars for manufacturing plants in which to ship their products is steadily decreasing, and in the Pittsburgh district many plants are closed entirely for lack of coal and also because they cannot get cars in which to ship products that are piled up in warehouses. The output of finished steel products in the district to-day is not over 50 per cent of capacity, and it may be less. Output of pig iron is about at the same rate, and it is very likely to be still further reduced as a number of blast furnaces in the Pittsburgh and Youngstown districts will have to bank this week for lack of coke. On Tuesday no cars were loaded with coke and some furnaces had

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron,	Feb. 6, 1918	Jan. 30, 1918	Jan. 9, 1918	Feb. 7, 1917
Per Gross Ton:				
No. 2 X, Philadelphia...	\$34.25	\$34.25	\$34.25	\$31.00
No. 2, Valley furnace...	33.00	33.00	33.00	31.00
No. 2, Southern, Cin'ti...	35.90	35.90	35.90	26.90
No. 2, Birmingham, Ala...	33.00	33.00	33.00	24.00
No. 2, furnace, Chicago*	33.00	33.00	33.00	30.00
Basic, del'd, eastern Pa...	33.75	33.75	33.75	30.50
Basic, Valley furnace...	33.00	33.00	33.00	30.00
Bessemer, Pittsburgh...	37.25	37.25	37.25	35.95
Malleable Bess., Chicago*	33.50	33.50	33.50	31.00
Gray forge, Pittsburgh...	32.75	32.75	32.75	29.95
L. S. charcoal, Chicago...	37.50	37.50	37.50	33.75

Rails, Billets, etc. Per Gross Ton:	Feb. 6, 1918	Jan. 30, 1918	Jan. 9, 1918	Feb. 7, 1917
Bess. rails, heavy, at mill	\$55.00	\$55.00	....	\$38.00
O.-h. rails, heavy, at mill	57.00	57.00	....	40.00
Bess. billets, Pittsburgh...	47.50	47.50	\$47.50	65.00
O.-h. billets, Pittsburgh...	47.50	47.50	47.50	65.00
O.-h. sheet bars, P'gh...	51.00	51.00	51.00	65.00
Forging billets, base, P'gh...	60.00	60.00	60.00	85.00
O.-h. billets, Philadelphia	50.50	50.50	50.50	60.00
Wire rods, Pittsburgh...	57.00	57.00	57.00	75.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	3.685	3.685	3.685	3.159
Iron bars, Pittsburgh...	3.50	3.50	3.50	3.25
Iron bars, Chicago...	3.50	3.50	3.50	3.00
Steel bars, Pittsburgh...	2.90	2.90	2.90	3.25
Steel bars, New York...	3.095	3.095	3.095	3.419
Tank plates, Pittsburgh...	3.25	3.25	3.25	4.75
Tank plates, New York...	3.445	3.445	3.445	4.919
Beams, etc., Pittsburgh...	3.00	3.00	3.00	3.25
Beams, etc., New York...	3.195	3.195	3.195	3.419
Skelp, grooved steel, P'gh...	2.90	2.90	2.90	3.25
Skelp, sheared steel, P'gh...	3.25	3.25	3.25	3.50
Steel hoops, Pittsburgh...	3.50	3.50	3.50	3.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Feb. 6, 1918	Jan. 30, 1918	Jan. 9, 1918	Feb. 7, 1917
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh...	5.00	5.00	5.00	4.50
Sheets, galv., No. 28, P'gh...	6.25	6.25	6.25	6.25
Wire nails, Pittsburgh...	3.50	3.50	3.50	3.00
Cut nails, Pittsburgh...	4.00	4.00	4.00	3.50
Fence wire, base, P'gh...	3.25	3.25	3.25	2.95
Barb wire, galv., P'gh...	4.35	4.35	4.35	3.85

Old Material, Per Gross Ton:

Carwheels, Chicago...	\$30.00	\$30.00	\$30.00	\$18.50
Carwheels, Philadelphia...	30.00	30.00	30.00	20.50
Heavy steel scrap, P'gh...	30.00	30.00	30.00	22.00
Heavy steel scrap, Phila...	30.00	30.00	30.00	20.00
Heavy steel scrap, Ch'go...	30.00	30.00	30.00	21.25
No. 1 cast, Pittsburgh...	30.00	30.00	30.00	19.00
No. 1 cast, Philadelphia...	30.00	30.00	30.00	20.00
No. 1 cast, Ch'go (net ton)	26.00	26.00	26.00	15.00
No. 1 RR. wrot, Phila...	35.00	35.00	35.00	25.00
No. 1 RR. wrot, Ch'go (net)	31.25	31.25	31.25	23.50

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$6.00	\$6.00	\$6.00	\$9.00
Furnace coke, future...	6.00	6.00	6.00	6.00
Foundry coke, prompt...	7.00	7.00	7.00	10.00
Foundry coke, future...	7.00	7.00	7.00	8.00

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	23.50	23.50	23.50	33.00
Electrolytic copper, N. Y.	23.50	23.50	23.50	33.00
Spelter, St. Louis...	7.62 1/2	7.62 1/2	7.62 1/2	10.00
Spelter, New York...	7.87 1/2	7.87 1/2	7.87 1/2	10.25
Lead, St. Louis...	6.85	6.85	6.85	8.30
Lead, New York...	7.00	7.00	6.70	8.50
Tin, New York...	85.00	85.00	85.00	55.00
Antimony (Asiatic), N. Y.	14.00	14.00	14.50	25.00
Tin plate, 100-lb. box, P'gh...	\$7.75	\$7.75	\$7.75	\$7.00

only a 48-hr. supply. These deplorable operating conditions are increasing manufacturing costs very rapidly, and on some lines of finished steel products owners of the smaller plants say they cannot meet these and come out with a profit. Railroad embargoes are still on everywhere, and the constant complaint of manufacturers is that they could do plenty of business but cannot get cars. The intensely cold weather that we have had for nearly three months has almost paralyzed the steel business, and it came just at the time when every pound of steel that could possibly be turned out was badly needed by the Government on its own direct orders and by private concerns running on indirect Government orders. One leading steel pipe interest reports that its output of tubular goods in January was only about 60 per cent of normal, and indications are that it will be still less this month. The fact that prices on pig iron and steel products are in effect only until March 31 is doing much to hold back the placing of new orders. Steel manufacturers are not anxious to take on new business for delivery after March 31, not knowing what prices will rule, and consumers are holding off from buying for the same reason. The result is that probably more than 75 per cent of the business on which the steel mills are running at present is coming from the Government on direct orders and probably 10 per cent or more on indirect orders. It is remarkable the small amount of finished steel for which orders have been placed by private consumers in the past two months or more. Pittsburgh steel makers are very much pleased with the appointment of Edward J. Stettinius as Surveyor General of Army Purchases. Mr. Stettinius formed the acquaintance of many of the heads of local steel companies while he was acting as purchasing agent for our Allies and he was highly regarded. The only hope that exists for betterment in the steel business is mild weather, and it is the earnest wish of producers and consumers alike that this will soon come and that we will also have an early spring. The movement of coal from mines up the Monongahela River has again been stopped owing to that river freez-

ing over, and many manufacturing plants along both sides of the Monongahela River and also below Pittsburgh, are running very light, not being able to get enough coal. Railroads and committees of various kinds are doing all they can to better the transportation conditions, but as long as the excessively cold weather lasts their efforts are not likely to meet with much success.

Pig Iron.—Operating conditions among the blast furnaces in the Pittsburgh, Youngstown and other districts are no better, owing to lack of coke and coal, and are liable to be worse. To-day the Carnegie Steel Co. has 13 blast furnaces banked, 14 idle and 32 in operation. The Jones & Laughlin Steel Co. has four out of six Eliza furnaces banked, one Soho and two of its four Aliquippa, Pa., furnaces. The National Tube Co. has one McKeesport furnace out and three blowing, while at Lorain it has four furnaces banked and only one in operation. The Shenango Furnace Co. has blown out No. 4 blast furnace at Sharpsville for lack of coke, preferring to give all the coke it is receiving to its other two stacks and operate them to as full capacity as possible. All the blast furnaces that are running are being driven very light, probably not over 60 per cent of capacity. Ordinarily blowing engines operate at about 110 revolutions per minute, but the practice for some time has not been above 60 to 65 revolutions per minute. The quality of coke coming in is very bad, the ash running in some cases as high as 14 per cent, and the sulphur is also very high. Much of the coke is being burnt, this destroying the carbon and in turn it makes bad iron. There is practically nothing being done in the way of new sales of pig iron, all the steel companies being short of metal and would gladly buy it if they could get it. There is some inquiry for foundry iron and also for basic for second quarter, but as a rule furnaces are not willing to sell for deliveries beyond April 1. Operating costs are steadily increasing, the supply of coke is getting worse, and there are other uncertainties confronting the manufacturer of pig iron, so that furnaces have no idea of what their costs will be when the second

quarter comes. The inquiry for foundry iron is fairly heavy, and the supply is very limited. There have been no sales of moment of any grades of pig iron in the past week or more.

We quote as follows: Basic pig iron, \$33; Bessemer, \$36.30; gray forge, \$32; No. 2 foundry, \$33; No. 3 foundry, \$32.50, and malleable Bessemer, \$33.50, all per gross ton at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being 95c. per ton.

Billets and Sheet Bars.—Output of semi-finished steel in the forms of billets and sheet bars is not running to more than 60 per cent of capacity. All the steel mills are short of pig iron, also of fuel, and on many of the intensely cold days the men do not report for work. The Government is still taking probably 75 per cent or more of the output of open-hearth steel, and Bessemer steel is being used more and more in the manufacture of finished products, where formerly open-hearth steel was used almost entirely. There is some inquiry for billets and sheet bars. It is impossible to find any mills that will sell steel, but they would gladly buy it in large quantities if it could be had. Several dealers in this city who formerly handled very large quantities of billets and sheet bars, either on direct purchases or by conversion contracts, say they have not sold a ton of steel for several months. There is no indication at present of conditions so shaping themselves as to allow a larger output of steel. If the cold weather lasts much longer, the output of steel is certain to be further decreased.

Steel Rails.—Practically nothing is being done in the way of new sales of standard sections, the mills being filled up for all of the year, but there is quite an active demand for light rails, and several mills are in position to quote for fairly prompt delivery. Prices on Bessemer standard sections range from \$60 to \$63 and on open-hearth from \$62 to \$65, at mill. It is said the Government is placing orders for Bessemer standard sections at \$55 and for open-hearth at \$57, at mill. The Government price on light rails, rolled from billets, is \$3 per 100 lb. for 25-lb. to 45-lb. sections.

Ferroalloys.—The railroad congestion is making deliveries of ferroalloys almost impossible. Many mills are running short and have inquiries out for a carload or two for quick shipment to help out until delayed shipments arrive. There were sales in the past week of five or six carloads of 80 per cent domestic ferromanganese at about \$250 per gross ton delivered. A Wheeling, W. Va., consumer is said to have placed about 500 tons of 50 per cent ferrosilicon at \$165 or \$170 delivered, probably the latter price. We quote 80 per cent domestic ferromanganese at \$250 and 18 to 22 per cent spiegeleisen at \$65 to \$70 delivered. We quote 50 per cent ferrosilicon at \$170 to \$175 delivered.

We now quote 9 per cent Bessemer ferrosilicon at \$54, 10 per cent \$55, 11 per cent \$58.30, 12 per cent \$61.60. We quote 6 per cent silvery iron \$40, 7 per cent \$42, 8 per cent \$44.50, 9 per cent \$47, 10 per cent \$50. Three dollars per gross ton advance for each 1 per cent silicon for 11 per cent and over. All the above prices are f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, these furnaces having a uniform freight rate of \$2 per gross ton, for delivery in the Pittsburgh district.

Structural Material.—Commercial demand is very dull, but the Government is placing very large quantities of structural steel work, most of which is being taken by local fabricators. The McClintic-Marshall Co. has taken in the past week or two from 25,000 to 30,000 tons of structural steel work for Government and private consumers. A recent request came from Washington to the effect that no new contracts for private dwellings or store buildings should be placed, if possible to hold off, in order that steel, labor and other materials could be diverted to Government work. This will likely have the effect of still further reducing the amount of new work being placed. It has been very light for some months. Railroads are buying very little, doing only absolutely necessary work. We quote beams and channels up to 15 in. at 3c. at mill.

Plates.—Reports that the Government has placed 400 of the 600 cars intended for shipment to France can not be confirmed here, local steel car companies saying they have no knowledge of the placing of this order. No important inquiries for steel cars for rail-

roads have come out for some time, and the two local steel car companies are operating very largely on Government work, running very light on steel cars and cleaning up contracts taken some months ago. Deliveries of plates are fairly good, but shipments of material for the steel car companies are very light and they can not get cars. The amount of plates being offered by the smaller mills for fairly prompt delivery is getting steadily larger, in spite of the fact that most of these mills are not operating to more than 60 per cent. Foreign shipments are cut off entirely by embargoes and large quantities of plates intended for export are being released to domestic consumers. We quote $\frac{1}{4}$ in. and heavier sheared plates at 3.25c. at mill, Pittsburgh.

Sheets.—The Government is making very heavy purchases of all grades of sheets for its own use in this country and in France, and also for the Allies. A recent order placed was for 12,000 tons, divided among different mills, and other large orders are in prospect. The demand for sheets from private consumers is light, and sheet mills are not anxious to sell for delivery beyond March 31, as a change in prices may come at that time, but the sheet trade here believes that present prices on sheets may rule all through this year. Output of sheets for several months has not been more than 50 per cent of capacity, and at this time it may be less, as the supply of steel and fuel is being steadily cut down. Many thousands of tons of sheets are piled up in warehouses of the mills, awaiting cars for shipment. Prices on sheets are given in detail on page 413.

Tin Plate.—A meeting of independent tin plate mills was held in this city on Thursday, Jan. 31, and it was decided to compile a full statement of the tin plate orders on the books of the mills, giving the destination of these orders, with other information, and send it to the Food Administration Bureau at Washington. Statements are also to be prepared showing the movement of tin bars to the tin plate mills, these to give the origin of these bars, how fast shipments are being made, etc. Already the railroads are furnishing a larger supply of cars to some of the tin plate mills, mostly those located along the Ohio river at Steubenville, Weirton, and other places that may be damaged by the expected flood. The Baltimore & Ohio Railroad lifted an embargo for shipments to the West and recently the American Sheet & Tin Plate Co. made shipments over this road of nearly 200 cars of tin plate to the Pacific Coast from its tin mills at Newcastle, Sharon and Farrell, Pa. The outlook for heavier shipments of tin plate is somewhat better, most of the larger mills operating close to 90 per cent and will continue to do so as long as they can get steel and coal fast enough. We quote tin plate in small and large lots at \$7.55 per base box at mill, rolled from Bessemer or open hearth stock. Prices on tin plate are given on page 413.

Iron and Steel Bars.—Output of steel bars is very much curtailed owing to scarcity of steel and fuel, some of the mills running to 50 per cent of capacity or less. The Government is still a fairly heavy buyer of both iron and steel bars, while the general trade is also buying quite actively, the mills being filled up for two or three months ahead. Implement makers are specifying heavily on their contracts for steel bars placed some time ago. The demand for reinforcing steel bars is dull, owing to the large falling off in building operations all over the country. We quote steel bars rolled from old steel rails at 3c; from steel billets 2.90c. and refined iron bars 3.50c. f.o.b. mills, Pittsburgh.

Rods.—There is an absolute famine in the supply of rods, owing to the heavy demand and also to the fact that the rod mills are not running at more than 50 to 60 per cent of capacity on account of shortage in steel and fuel. Two local makers of rods say they are not quoting on new inquiries, having all the orders on their books they care to take over the next two or three months. The export demand is heavy, and large shipments of rods are going to Canada and also to the Orient, the latter by way of the Pacific coast. Much higher prices are obtained on rods for export than from

domestic consumers. Prices on rods are given in detail on page 413.

Wire Products.—The Government is still a heavy buyer of wire nails, and last week placed contracts for about 3500 kegs, including about 20,000 kegs for the Navy Department for export to France. In addition, the Quartermaster of the Army placed about 15,000 kegs for shipment to various places in this country, while an inquiry is out for about 20,000 kegs for delivery at Charleston, W. Va. Part of the latter order has already been placed. There is also a Government inquiry in the market for 5000 kegs of wire nails for shipment to the nitrate plant at Sheffield, Ala. As a rule, the American Steel & Wire Co. is taking about one-half of the quantities of wire nails called for in Government orders, while the other half is divided among other mills, largely pro-rata on their capacity. The general inquiry for wire nails from private consumers is fairly heavy, and all the mills making wire and wire nails are well filled up over the next three months. The output is very much cut down, owing to shortage in steel and scarcity of fuel. Some mills making wire products are diverting more and more of their steel to other lines on which the margin of profit is larger. Prices on wire products are given in detail on page 413.

Nuts and Bolts.—The Government has not placed any large orders for nuts and bolts lately, but is still taking probably 90 per cent of the output of the makers on old contracts. Private consumers have been buying very lightly for some time. Makers and consumers alike are holding off doing new business until after March 31 in view of the possible revision of prices on that date. Discounts on nuts and bolts are given on page 413.

Rivets.—The Government has an inquiry out for 3000 tons of rivets, sizes ranging from $\frac{1}{4}$ in. and up, which is likely to be placed among the makers this week. The demand from the general trade is reported active, and rivet makers say they could do a great deal of business if they had cars to ship their product. Several plants in this district are about closed, as their warehouses are full, and they will have to stop manufacturing entirely before long, unless the railroad congestion clears up. We quote structural rivets at \$4.65 and cone head boiler rivets at \$4.75 per 100 lb. f.o.b. Pittsburgh.

Hoops and Bands.—The new demand from the general trade is only fair, but the Government is still placing heavy orders for hoops and bands. Output is cut down very much, owing to shortage of steel and fuel, and shipments are held up for lack of cars. We quote steel hoops at 3.50c. and steel bands at 2.90c. extras on the latter as per the steel bar card, f.o.b. Pittsburgh.

Shafting.—The Government is still placing 75 per cent or more of the output of shafting on direct and indirect orders. The demand from the general trade is dull, the automobile builders buying very little, and shipments on their contracts are held up. Output of shafting is not more than 50 per cent of normal, due to shortage in steel and fuel. We quote cold-rolled shafting in small or large lots at 17 per cent off list, f.o.b. Pittsburgh.

Cold-Rolled Strip Steel.—The Government is a fairly heavy buyer, but the demand from the general trade is quiet. None of the mills making cold-rolled strip steel is able to operate to more than 50 per cent of capacity on account of shortage in steel and lack of coal. Two plants in this district have operated very little for several weeks. Owing to the uncertainty as to prices, mills are not anxious to sell very far ahead.

We quote cold-rolled strip steel at \$6.50 per 100 lb., f.o.b. Pittsburgh, terms 30 days, less 2 per cent for cash in 10 days, when sold in quantities of 300 lb. or more.

Hot-Rolled Strip Steel.—Makers report the new demand only fairly active, and output is curtailed very much by shortage in supply of coal and in steel. We quote hot-rolled strip steel at \$4.50 base per 100 lb., f.o.b. Pittsburgh.

Spikes.—Very few railroads have as yet come in the market for their needs of spikes for the current

year, and the new demand has been very dull for some time. Makers report that boat spikes are very active, and they are sold up for some months.

We quote standard sizes of railroad spikes, $9/16 \times 4\frac{1}{2}$ in. and larger, at \$3.90 per 100 lb. in lots of 200 kegs of 200 lb. each, or in larger lots. Boat spikes are held at \$5.25 per 100 lb., f.o.b. Pittsburgh.

Wrought Pipe.—One leading mill reports that it was able to ship last month only about 50 per cent of its output of tubular goods, and no doubt this condition prevails at most of the other mills. The Continental Works of the National Tube Co. in this city is still closed down for lack of coal, while its Pennsylvania works, also in this city, is running only partly full for the same reason. Some fairly large inquiries for line pipe are coming out, and pipe makers expect that developments in the oil and gas fields this year will be very active. The Government is still a fairly large buyer of iron and steel pipe, but the demand from the general trade is only fair. Output of iron and steel pipe at present is probably not over 50 per cent of normal, due to the shortage in supply of steel and coal. Hundreds of thousands of tons of finished tubular goods are piled up in warehouses of mills awaiting cars for shipment, and early relief is not in sight. Discounts on iron and steel pipe are given on page 413.

Boiler Tubes.—Operating conditions are very bad, due to shortage in supply of steel and coal, and output is probably not over 50 per cent of normal. The Government is placing heavy orders for locomotive and boiler tubes and mills are filled up for months. Discounts on iron and steel tubes are given on page 413.

Coke.—There is absolutely no betterment in operating conditions in the coke trade, but, on the contrary, the situation is worse. On Tuesday this week, no cars were furnished for loading, and the general average of cars last week was only 35 to 40 per cent of normal. The quality of coke being made is very much below the usual standard, and there is much complaint from blast furnaces about this. It is claimed most of the coke is running very high in ash and sulphur and the natural result is poorer. There is no betterment in sight, and the present output of coke is not over 50 to 60 per cent of normal. Several large plants were practically closed down nearly all of last week.

Old Material.—The scrap trade in this district is at practically a standstill, and the situation as regards doing business between dealers and consumers could hardly be worse. For several months, embargoes have been on both East and West and in addition, permits for shipments of scrap are very hard to obtain. Dealers say they are unable to buy scrap at prices fixed by the Government, claiming that the railroads and the mills making scrap are selling direct to consumers. The market is almost stagnant, and will continue so until the railroad congestion is relieved. Consumers report they are running very short of scrap, and this is having its effect in cutting down the output of steel. We have not heard of any sales of scrap during the past week. Dealers say they would about as soon not do any business under the present unsatisfactory conditions, stating that when they do make a sale, they cannot get cars to give the scrap to the buyer.

Heavy steel melting scrap, Steubenville, Folsom, Brackenridge, Monessen, Midland and Pittsburgh, delivered.....	\$30.00
No. 1 foundry cast.....	30.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., Franklin, Pa., and Pittsburgh.....	35.00
Hydraulic compressed sheet scrap.....	\$26.00 to 27.00
Bundled sheet scrap, sides and ends f.o.b. consumers' mill, Pittsburgh district.....	24.00 to 25.00
Bundled sheet stamping scrap.....	22.00 to 23.00
No. 1 railroad malleable stock.....	30.00
Railroad grate bars.....	19.00 to 20.00
Low phosphorus melting stock.....	40.00
Iron car axles.....	47.50
Steel car axles.....	47.50
Locomotive axles, steel.....	47.50
No. 1 busheling scrap.....	27.00 to 28.00
Machine shop turnings.....	20.00
Cast iron wheels.....	30.00
Rolled steel wheels.....	35.00 to 37.00
*Sheet bar crop ends.....	39.00 to 40.00
Cast iron borings.....	20.00
No. 1 railroad wrought scrap.....	35.00
Heavy steel axle turnings.....	25.00 to 26.00
Heavy breakable cast scrap.....	30.00

*Shipping point.

Chicago

CHICAGO, Feb. 5—(By Wire).

Little or no betterment has taken place in the doleful situation inflicted on the steel industry by inadequate railroad performance and the consequent shortage of fuel for plant operations and inability to move finished products. Operations average 50 to 60 per cent of capacity. With the leading interest there is no change, six blast furnaces being in operation at Gary, four at South Works and one at Joliet. The leading independent started its third stack last Thursday, after a rest of over two weeks because of insufficient coke. The irony of it all is that there is plenty of coal, much of it lying along the right of way, but there is not enough motive power to haul it apparently. On Monday, of course, all mills rolled steel for the Government only. Changing rolls incidentally for the one-day shift in operations restricts output and adds to costs. Some coal much needed by a bar mill and consigned to it was shunted to a plant making corn products. Noteworthy Government orders are to be placed here, according to notice given. In this connection it is interesting to note that shipments of rivets for the Emergency Fleet Corporation, already in cars, have not moved. An Eastern mill, ordinarily an important factor in this market, is now offering specialties only, having troubles enough at home. The foreign demand for sheets, bars and other products has revived, but little has been done. On export orders 3.50c., base, is quoted on bars. The Orient wants sheets, with little available for it. Cast-iron pipe is more active. Last-half contracts for pig iron closed in the week represent a large tonnage, probably 75,000 tons of basic having been placed, while malleable and other grades were active also. Low phosphorus, much specified by the Government, is extremely scarce.

Pig Iron.—Contracting for last-half delivery has been proceeding at a lively rate, the leading Northern interest having placed about half its output expected in the last six months of the year. All kinds of iron are in demand, perhaps 75,000 tons of basic having been placed in the week from this center, while malleable and other grades have been active. There is a pronounced scarcity of low phosphorus, especially in the East, reports having reached Chicago that the Crucible Steel Co. of America and the Bethlehem Steel Co. are in need, the latter company wanting 10,000 to 15,000 tons, despite the fact that it is not long since the company was selling its own production of low phosphorus. The cause of the scarcity lies in the numerous Government specifications for iron analyzing 0.035 phosphorus. The leading southern producer of foundry iron has been selling heavily. It reports that some foundry grades are getting scarce, and predicts that if the present volume of buying continues, it will not be long before furnaces will be withdrawn from the market, even for the last half. At present its offerings for last half are fairly complete. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5.....	\$37.50
Lake Superior charcoal, No. 6 and Scotch....	40.00
Northern coke foundry, No. 1.....	33.50
Northern coke foundry, No. 2.....	33.00
Northern coke foundry, No. 3.....	32.50
Northern high-phosphorus foundry.....	33.00
Southern coke No. 1 foundry and No. 1 soft..	38.50
Southern coke No. 2 foundry.....	37.00
Malleable Bessemer.....	33.50
Basic.....	33.00
Low phosphorus (copper free).....	53.00
Silvery, 7 per cent.....	44.54

Plates.—The domestic demand is quiet, probably for the reason that no considerable quantities can be obtained. An Eastern mill is no longer offering, and the local producers have none to sell, but plates under 72 in. are still available. The mill quotation is 3.25c. Jobbers quote 4.45c.

Ferroalloys.—Eighty per cent ferromanganese has been fairly active at \$250 delivered. This price is strong in view of the threatened shortage of ore because of inadequate coal supply for rail transportation in Brazil. Rail conditions in this country prevent the accumula-

tion of ore at the furnaces, and shipments almost in sight have been held up. Some Bessemer ferrosilicon has been sold for last-half delivery by Ohio makers at Government prices, the furnaces retaining the option of delivering material ranging from 10 to 12 per cent. Spiegeleisen is scarce.

Structural Material.—The Western Electric Co., Chicago, has prepared plans for a new building which will require about 3000 tons, about two-thirds of which will be Bethlehem shapes. A permit has been issued for the Butler Brothers building, into which between 7000 and 9000 tons will go. The John Griffiths & Sons Co. has the general contract, but the steel has not been let. The Kansas City Structural Steel Co. will supply 197 tons for a crusher plant for the Utah Copper Co., Arthur, Utah. No car lettings or new business are reported, and the general market has been quiet. The mill price is 3c. Jobbers quote 4.20c.

Bars.—A moderate sized tonnage of mild steel bars for February and March delivery has been booked, and some has been sold for shipment to the Orient, the export price being 3.50c. base. The mill price for domestic shipment is 2.90c. Pittsburgh or Chicago. Bar iron is moving a shade better and considerable improvement is expected because of the scarcity of steel. The official price is 3.50c., Chicago. Rail carbon bars continue quiet, but makers have all they can handle in view of the scarcity of rerolling rails. The quotation for high carbon bars is 3c., Chicago, taking fixed extras.

Soft steel bars, 4.10c.; bar iron, 4.10c.; reinforcing bars, 4.10c., base, with 5c. extra for twisting sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting, list plus 10 per cent.

Wire Products.—Operations at the Joliet plant of the leading interest were resumed last Wednesday, but stopped again after a day's run because of a lack of steel which, in turn, was traceable to a lack of coal. Not much hope is entertained of a betterment in the near future. We quote prices at Government levels as follows:

Nails, \$3.50. Pittsburgh; plain fence wire, \$3.25; painted barb wire, \$3.65; galvanized barb wire, \$4.35; polished staples, \$3.65, and galvanized staples, \$4.35.

Rails and Track Supplies.—Inquiry for miscellaneous lots of standard section rails has continued in fair volume. It is to be noted that while steel tie plates are quoted at 3.25c., the official price of wrought-iron tie plates is 3.75c. We quote:

Standard railroad spikes, 4.11 $\frac{1}{2}$ c., Chicago. Track bolts, with square nuts, 5.11 $\frac{1}{2}$ c., Chicago. Tie plates, 3.25c., f.o.b. maker's mill. The base for light rails is 3c., f.o.b. maker's mill for 25 to 45-lb. sections, lighter sections taking Government extras.

Sheets.—The sheet situation is tighter, especially that in black and galvanized. Some sheets are available, but the leading independent maker has nothing for the first quarter. It will have some blue annealed free in May or June, but it is not selling beyond the first quarter. There is a notable revival of export demand, mostly from the Orient, but business is not resulting to any great extent, because the mills have all they can handle as far ahead as they like to go. Exports are restricted to sheets $\frac{1}{8}$ in. and under. We quote No. 10 blue annealed, 4.25c.; No. 28 black, 5c., and No. 28 galvanized at 6.25c., Pittsburgh. Warehouse prices are unchanged at official levels.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 5.45c.; No. 28 black, 6.45c., and No. 28 galvanized, 7.70c.

Cast-Iron Pipe.—The market is livelier than it has been for months. Toledo, Ohio, is taking bids to-day on 500 tons. Yesterday St. Paul took bids on about 800 tons. Minneapolis will take bids Feb. 8 on 1400 tons, and the 900 tons for which Akron, Ohio, inquired, is pending.

Quotations per net ton, Chicago, are as follows: Water pipe, 4-in., \$57.30; 6-in. and larger, \$54.30, with \$1 extra for Class A water pipe and gas pipe.

Old Material.—Consumers are showing a little more interest, but the market remains quiet. Difficulty in obtaining cars and labor and the inactivity of capital tied up in delayed shipments contribute to the troubles of dealers and brokers. Some progress has been made toward unanimity of opinion with regard to construing

the recently recommended prices, but there still are different interpretations of some of the points involved, which, it is hoped, the new scrap committee will straighten out. Some dealers hold that it would be a better arrangement to have sales made f.o.b. producing point, instead of consuming point. Coil springs are quoted on a basis of \$40 gross. No. 2 railroad wrought is quoted at almost the level of No. 1, but in the case of the latter a commission of 3½ per cent is paid, but not with the former, the maximum price not having been reached. Definite rulings on every grade of scrap by recognized authority would be a healthy event for the entire trade. Small lists have been issued by the Pennsylvania, C., B. & Q. and the Pere Marquette. We quote for delivery in buyers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	\$38.00 to \$39.00
Relaying rails	60.00
Old carwheels	30.00
Old steel rails, rerolling	35.00
Old steel rails, less than 3 ft.	34.00 to 35.00
Heavy melting steel	30.00
Heavy melting steel, cut short lengths	33.00
Frogs, switches and guards, cut apart	30.00
Shoveling steel	30.00
Steel axle turnings	25.00 to 26.00

Per Net Ton	
Iron angles and splice bars	\$37.00 to \$38.00
Iron arch bars and transoms	39.00 to 40.00
Steel angle bars	30.50 to 31.00
Iron car axles	47.00 to 48.00
Steel car axles	42.42
No. 1 railroad wrought	31.25
No. 2 railroad wrought	30.25 to 31.50
Cut forge	30.00 to 30.50
Pipes and flues	24.00 to 24.50
No. 1 busheling	25.50 to 26.50
No. 2 busheling	18.00 to 19.00
Steel knuckles and couplers	33.50 to 34.50
Coil springs	35.70
No. 1 boilers, cut to sheets and rings	22.00 to 23.00
Boiler punchings	32.00 to 33.00
Locomotive tires, smooth	36.50 to 37.50
Machine-shop turnings	16.50 to 17.00
Cast borings	16.50 to 17.00
No. 1 cast scrap	26.00 to 26.75
Stove plate and light cast scrap	21.50 to 22.50
Grate bars	21.50 to 22.50
Brake shoes	24.00 to 25.00
Railroad malleable	26.80
Agricultural malleable	26.80
Country mixed scrap	21.50 to 22.50

Bolts and Nuts.—New business is quiet, but specifications are heavy. Makers see no prospect of betterment in regard to the inadequate quantity of raw material which is reaching them. For prices and freight rates see finished iron and steel f.o.b. Pittsburgh, page 413. Jobbers quote as follows:

Structural rivets, 5.50c.; boiler rivets, 5.60c.; machine bolts up to ¾ x 4 in., 40 and 10 per cent off; larger sizes, 35 and 5 off; carriage bolts up to ¾ x 6 in., 40 and 2½ off; larger sizes, 30 and 5 off; hot pressed nuts, square tapped, \$1.05 off, and hexagon tapped, 85c. off per 100 lb.; coach or lag screws, gimlet points, square heads, 50 per cent off.

Cincinnati

CINCINNATI, Feb. 5—(By Wire).

A number of orders for southern foundry iron to be shipped in the second half have been received recently. An Indiana melter booked 1600 tons, a central Ohio company 1000 tons, and there were scattered lots of 100 to 400 tons sold in southern Ohio and Indiana. A Canadian firm also bought 1200 tons for the same shipment. Only a few furnaces in the South are taking business, and all contracts are made subject to Government revision, but an additional clause is inserted giving the furnace the privilege of cancelling the order in case a readjustment is made at figures below the cost of production. In some circles it is thought that this proviso makes these contracts of doubtful value, but buyers evidently do not believe there will be any downward revision, as few objections have been made. A little Virginia iron for first-quarter shipment has recently been sold in northern Ohio, but none in this immediate vicinity. The Ironton furnaces are still out of the market for any delivery, and it is not known when they will open their books for last half contracts. Railroad embargoes still prevent shipments of any southern iron north of the Ohio River. Shipments from Ironton to certain points are also restricted, with weather conditions to-day indicating no improvement in the situation. The average invoice price of southern

iron shipped before the embargoes went into effect indicates that considerable low-priced iron is yet to be delivered. Based on freight rates of \$2.90 from Birmingham and \$1.26 Ironton, we quote f.o.b. Cincinnati as follows:

Southern coke, No. 2 foundry and 2 soft	.....\$35.90
Southern Ohio, No. 2	.....34.26
Basic, Northern	.....34.26

Finished Material.—Some small, urgent orders for structural material have been received from the outside, but shipments cannot be made and the only deliveries now possible are to nearby points and others accessible by auto trucks. Jobbers of wire nails report hardware merchants as placing orders for spring delivery, but the amounts are smaller than usual. There is some demand for hoops and bands, but the mills are unable to make shipments.

Jobbers' prices are unchanged as follows: Iron and steel bar, 4.08½c.; twisted bars, ¾ x 1¼-in., 4.23½c.; ¾-in., 4.33½c.; ½-in., 4.43½c.; ¼-in., 4.63½c., and ¼-in., 4.88½c. Structural shapes are quoted at 4.18½c.; plates, ½-in. and heavier, 4.43½c.; No. 10 blue annealed sheets, 5.43½c. Cold rolled shafting is sold at 10 per cent discount. The mill price on No. 28 black sheets is 5.18½c., and No. 28 galvanized 6.43½c.

Coke.—The recent floods seriously handicapped operations in the West Virginia and Virginia fields. The Wise County district was particularly hard hit and both Pocahontas and New River outputs were also considerably reduced. The situation has not yet cleared up and it will be several days yet before the ovens will be turning out anything like the usual tonnage of coke. Shipments from the Connellsville field do not show any improvement and pig-iron furnaces depending on that district for a supply of fuel are mostly operating on a hand-to-mouth basis. The local foundries have secured sufficient coke to carry them along several days, but some of them may have to close at any moment unless further supplies are received.

Old Material.—Business is stagnant and outside shipments are impossible to make on account of railroad embargoes. Very little scrap is sold locally, and the amount disposed of to outside buyers for future shipment is also very much limited. It is predicted that as soon as the embargoes on shipments to the Pittsburgh district are raised, the large consumers there will be compelled to buy heavily to fill their requirements. The following are dealers' prices f.o.b. southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap	.....\$19.00
Old iron rails	.....\$32.00 to 32.50
Relaying rails, 50 lb. and up	.....44.00 to 44.50
Rerolling steel rails	.....33.00 to 33.50
Heavy melting steel scrap	.....27.00
Steel rails for melting	.....27.00 to 27.50
Old carwheels	.....25.00
Per Net Ton	
No. 1 railroad wrought	.....\$29.00 to \$29.50
Cast borings	.....13.00 to 13.50
Steel turnings	.....13.00 to 13.50
Railroad cast	.....24.50 to 25.00
No. 1 machinery	.....25.00 to 25.50
Burnt scrap	.....15.00 to 15.50
Iron axles	.....40.00 to 40.50
Locomotive tires (smooth inside)	.....33.50 to 34.00
Pipes and flues	.....19.00 to 19.50
Malleable cast	.....23.50 to 24.50
Railroad tank and sheet	.....17.00 to 17.50

Birmingham

BIRMINGHAM, ALA., Feb. 5.

Southern production of pig iron is again normal. The output at furnaces was disturbed by severe weather conditions which affected the coal and coke supplies and interfered with the transportation facilities. The output at furnaces during the first month of the year is short of expectations, and it is believed that February, though three days shorter, will provide more iron. The furnaces are working well now and full supplies are again felt in raw material. Delays are still noted in delivery of pig iron from the South with no promise of an improvement in the near future. An additional embargo was put on by one of the railroads running out of Birmingham toward the West and this cut out one of the open lines. However, this is not expected to last long, as the congestion can hardly be as pronounced as in the East. Inquiries are still frequent and a number of small lot sales are noted. Round ton-

nages of iron were sold by southern producers before the turn of the year, delivery during the first six months of this year. Consumers are still anxious to place orders for iron despite the clauses in the contract, which not only provide for a probable revision of the prices by the Government on April 1 but also give the right to the sellers to cancel the contract if the revision is downward. Home consumption shows a little improvement, but it is not by any means normal, as the cast iron pipe plants are not as yet melting as much iron as they did. However, there is a feeling that the pipe trade will shortly take on an improvement and that there will be need for considerable pipe in the spring. Foundries and machine shops know no abatement in their trade, not only Government business but much domestic work being offered. Steel mill operation in the South is somewhat better now with the coal supplies more nearly adequate than during the past month.

Coal and Coke.—There is a better coal and coke production in the South. The operators and union miners and mine workers in Alabama are now working under an agreement prepared by the Federal Fuel Administrator, with no recognition of the union.

Old Material.—The scrap iron and steel market is still unsettled though better prices obtain. The embargoes in various directions and the inability to make deliveries are the principal causes for the unsettled condition. There is considerable stock on hand. Dealers here do not show an inclination to sell in smaller markets, especially throughout the South, the grading being sharp. Quotations for old material are as follows:

Old steel axles	\$32.00 to \$33.00
Old steel rails	28.00 to 30.00
Heavy melting steel	23.00 to 24.00
No. 1 R. R. wrought	29.00 to 35.00
No. 1 cast	26.00 to 27.50
Old carwheels	25.00 to 30.00
Tramcar wheels	21.00 to 25.00
Machine shop turnings	17.50 to 19.00
Cast iron borings	13.00 to 15.00
Stove plate	19.00 to 21.00

St. Louis

St. LOUIS, Feb. 4.

Pig Iron.—Some small sales of pig iron continue to be made for furnaces which have found their output to have varied somewhat from their contracted estimates, but these have been few and under special conditions, thus preventing the transactions from reflecting any general market condition. While there has been an opening of the books for last half, to some extent, it has not resulted in any business of moment, as there is too much uncertainty to justify much definite contracting, and such sales as are being made are so hedged in with conditions as to practically nullify them as contracts and to leave them in the state of preferential bookings with no real obligation attaching to the furnaces. Pig irons of special analyses, the results of varying furnace runs, are being sold as usual, but these have no special bearing on the market. Shipping conditions are very bad, with only Government business having any influence on promptitude of delivery. Cars are in no better supply and movement is slower than ever. Some foundries are thus in a precarious condition so far as continuous operation is concerned.

Coke.—No contracting in coke is reported, the oven representatives having no supplies to book and no cars. Receipts of coke by foundries under contract have been bad and show little sign of improvement.

Finished Iron and Steel.—Receipts of finished products under existing contracts continue to become more and more unsatisfactory. Practically no effort is being made to do anything in the way of new business, and most efforts are directed to getting a line on material already contracted for or shipped from the mills. Movement out of warehouse continues to exceed the speed limit, and the warehouses are becoming very short on supplies, with little coming in to replace the constant drain. For stock out of warehouse we quote as follows: Soft steel bars, 4.17c.; iron bars, 4.17c.; structural ma-

terial, 4.27c.; tank plates, 4.52c.; No. 8 sheets, 5.47c.; No. 10 blue annealed sheets, 5.52c.; No. 28 black sheets, cold rolled, one pass, 6.52c.; No. 28 galvanized sheets, black sheet gage, 7.77c.

Old Material.—In the scrap market dealers are doing a little trading among themselves, but there is no marked demand from any of the consuming sources of call for scrap. The plants are operating on supplies in the yards or as delivered under existing contracts, but very little inclination is shown to place new business. Shipments are practically impossible, as cars cannot be obtained nor will railroads accept shipments unless there is a Government order involved. The severe weather is also having its effect on the general situation, as it is very difficult to gather up scrap with the temperature at its present low point. Absence of gondola cars and unwillingness of consumers to accept shipment in any other class because of the use of magnets for unloading also complicates the situation. The matter of prices is gradually settling down, however, and the Government figures are ruling, or else the commission plan is accepted in deals. We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district, as follows:

	Per Gross Ton
Old iron rails	\$36.00 to \$36.50
Old steel rails, rerolling	34.50 to 35.00
Old steel rails, less than 3 ft.	37.50 to 38.50
Relaying rails, standard sections, subject to inspection	60.00 to 75.00
Old carwheels	29.50 to 30.00
No. 1 railroad heavy melting steel scrap	29.50 to 30.00
Heavy shoveling steel	27.50 to 28.00
Ordinary shoveling steel	26.50 to 27.00
Frogs, switches and guards cut apart	29.50 to 30.00
Ordinary bundled sheet scrap	24.00 to 24.50
Heavy axle and tire turnings	22.50 to 23.00

	Per Net Ton
Iron angle bars	\$35.50 to \$36.50
Steel angle bars	28.50 to 29.00
Iron car axles	45.50 to 46.00
Steel car axles	43.00 to 43.50
Wrought arch bars and transoms	41.50 to 42.00
No. 1 railroad wrought	30.75 to 31.25
No. 2 railroad wrought	30.00 to 30.50
Railroad springs	30.00 to 30.50
Steel couplers and knuckles	30.75 to 31.25
Locomotive tires, 42 in. and over, smooth inside	34.00 to 35.00
No. 1 dealers' forge	23.50 to 24.00
Cast iron borings	17.00 to 17.50
No. 1 busheling	25.50 to 26.00
No. 1 boilers, cut to sheets and rings	23.00 to 23.50
No. 1 railroad cast scrap	25.50 to 26.00
Stove plate and light cast scrap	20.50 to 21.00
Railroad malleable	26.00 to 26.50
Agricultural malleable	23.00 to 23.50
Pipes and flues	23.50 to 24.00
Heavy railroad sheet and tank scrap	22.50 to 23.00
Railroad grate bars	19.00 to 19.50
Machine shop turnings	17.50 to 17.75
Country mixed scrap	20.50 to 21.00
Uncut railroad mixed scrap	23.50 to 24.00

San Francisco

SAN FRANCISCO, Jan. 29.

While there has been no suspension of business on the Pacific Coast due to Government orders and no tie-up in freight due to weather conditions, the local market conditions in iron and steel reflect the eastern conditions very closely. The general stock of the jobbers is getting low, and while liberal orders have been placed, the prospects of deliveries in the near future seem remote. The hope is very generally expressed that the freight congestion may soon come to an end. This State is suffering from a serious lack of rain and this drought points to the necessity of sinking wells to much lower depths and running pipe lines farther up into the mountains in order to save the crops. Prices on iron and steel products for domestic sales are on a strictly Government basis, and in that aspect the situation is unchanged. The jobbers are frequently compelled to cut the cent allowance which the Government granted them, especially on long-term deliveries. Premiums are at times offered to mills and jobbers who can give prompt deliveries.

Bars.—The local mills are still working to capacity on bars. The price, 3.80c. base, f.o.b. San Francisco, with fairly prompt deliveries, is based on domestic business, but some tonnage for export was recently placed at about this price.

Structural Materials.—The condition in structural

steel remains unchanged. Practically the entire amount arriving is for the shipyards, and other lines needing large structural steel are at a standstill. There is a good demand for export of some shapes, if they could be obtained, including angles, beams and channels. However, when some stock of these shapes has been located in San Francisco, it has been found almost impossible to get a permit to ship them.

Plates.—The steel plate market is steady at the Government price. The stock on hand among the jobbers is less than that of any other steel product, and there seems little likelihood of this stock being replenished.

Sheets.—The market for sheet is firm at Government prices. Deliveries are slow, and are expected to remain so for some time. Premiums for prompt shipment abroad are being offered, but this business is small on account of the difficulty of getting cargo space or permits to ship.

Wrought Pipe.—The oil fields could use a great deal more steel pipe if they could get it. With the immense demand that is being made on the oil reserves of this State, a serious condition may be faced if new wells are not developed. This means more pipe than is being sent to this State at the present time. If the demand for pipes for irrigation from wells and at pumping plants be added to this oil demand, it would appear that there is a serious shortage of wrought pipe in California.

Cast Iron Pipe.—Possible users seem to regard the price as too high and decline to buy. But few scattering orders are reported on the Coast.

Pig Iron.—While there is still plenty of demand for pig iron, it is not as urgent as heretofore. Very little new business is being offered, and dealers are concentrating upon the task of getting deliveries through as soon as possible. One reason for the falling off in the inquiries is believed to be the general knowledge that the dealers are sold well through the first six months of the year, and that some have very little to offer even for the third-quarter delivery.

Coke.—The coke situation is described as acute by some dealers. As yet none of the foundries are suffering from a lack of coke, but the surplus stocks are getting low. While some are said to have enough to keep them going for several months, others, it is said, must increase their reserves within the next two or three weeks or be in danger of closing down in the near future. Under these circumstances the most promising phase of the situation comes in the announcement that a considerable shipment of coke will be made to this city as soon as the freight situation can be somewhat cleared up.

Old Materials.—The market for steel scrap is firm and for cast-iron scrap is somewhat weaker. Prices are unchanged. There is a fair accumulation of steel scrap, and a good demand. Iron scrap is very much slower.

Cleveland

CLEVELAND, Feb. 5—(By Wire).

The past week has shown no relief from the railroad congestion or improvement in the fuel situation or operating conditions in blast furnaces, steel and manufacturing plants in this territory. A slight rise in the temperature late in the week was followed Monday by the coldest weather for many years. Heatless Mondays do not seem to help the situation, and the general feeling is that there will be no marked improvement in railroad operating conditions until there are several days of moderate weather.

Iron Ore.—A number of the representatives of the leading ore firms were present at a meeting of the general committee of the American Iron and Steel Institute in New York last week and presented data regarding the cost of ore mining operations. Both the ore sellers and consumers are dissatisfied with the present situation in that ore prices are subject to Governmental revision April 1, but it does not appear probable that any further action more definitely fixing

prices will be taken by the Government much before that date. In the mean time, sellers continue to make reservations and are having their contract forms prepared containing the price revision clause. A few blast furnaces are refusing to sell pig iron for future delivery until the uncertainty about ore prices is removed.

Old range Bessemer, \$5.95; old range non-Bessemer, \$5.20; Mesaba Bessemer, \$5.70; Mesaba non-Bessemer, \$5.05.

Pig Iron.—The demand for pig iron for the last half is heavy and a shortage is developing in basic, foundry and malleable grades for that delivery. A leading selling interest states that it could quickly dispose of 500,000 tons of basic iron for the last half. Producers are making reservations for their regular trade, but the requirements of consumers are larger than normal. One selling agency is dividing its supply by scaling down orders to 20 per cent of the tonnage inquired for. One northern Ohio consumer has covered for nearly all of its basic requirements of approximately 50,000 tons for the last half. New demands for the Government are springing up almost every day. Sixteen hundred tons of northern foundry and charcoal iron for prompt shipment for the Navy Yards at Brooklyn and Mare Island have just been distributed by the pig iron committee of the American Iron and Steel Institute, which is also distributing 1200 tons of first half foundry iron for a Bay City, Mich., plant, and has 800 tons to place in Chicago for July and August delivery for the Emergency Fleet Corporation. The demand for southern iron for the last half is fairly active. Sales include one lot of 1000 tons to a Canadian customer. Shipments of southern iron continue very bad. The embargo through Cincinnati is still in effect and some iron is reaching the northern Ohio territory by being detoured as far as St. Louis. Ferromanganese is firm at \$250, delivered, and an Ohio interest has taken 1000 tons at that price.

Bessemer	\$37.25
Basic	33.30
Northern No. 2 foundry.....	33.30
Southern No. 2 foundry.....	37.00
Gray forge	32.30
Ohio silvery, 8 per cent silicon.....	46.12
Standard low phosphorus, Valley furnace.....	50.00

Coke.—There is much inquiry for prompt shipment foundry coke by consumers not getting deliveries on contracts, but no coke, either in foundry or furnace grades, is being offered for any delivery. Railroad shipments are reported to be about 50 per cent of normal.

Finished Iron and Steel.—Mill operations have improved, but the situation in respect to shipments of steel from mills to consumers is apparently becoming more serious every day. Railroad permits are often proving useless, as consumers on securing these are unable to procure cars to haul the steel. The Government, realizing the necessity of moving steel promptly to makers of agricultural implements, has, through the office of the Director General of Railroads, just issued an order that no embargoes shall apply on steel for implement manufacturers. However, cars must be supplied to make this order effective. The War Industries Board has adopted a more strict policy in regard to licenses for export shipments of plates and sheets. Heretofore material under 1/4 in. in thickness and for shipment to neutrals was exempted from the license requirement, but these exemptions have been removed. There is an increase in inquiry for steel bars, plates and shapes to cover future requirements and some consumers are trying to place orders for the third quarter delivery, but without success. There is a good demand for small lots of steel, almost wholly for Government work. Plates for boilers for 40 Government boats being built by the American Shipbuilding Co. have been distributed among different mills. The demand for sheets is active, and blue annealed sheets have become somewhat scarce for early shipment.

We quote warehouse prices as follows: Steel bars, 4.03 1/4 c.; plates, 4.38 1/4 c.; structural material, 4.13 1/4 c.; No. 10 blue annealed sheets, 5.35 c.; No. 28 black sheets, 6.35 c.; No. 28 galvanized sheets, 7.60 c.

Bolts, Nuts and Rivets.—Bolt and nut manufacturers are deeply interested in the issuance by the Govern-

ment of priority orders for the distribution of fuel oil, as many use oil as fuel in their furnaces and for some time have had great trouble in getting a sufficient supply to keep their plants in operation. Several Government inquiries aggregating 100,000,000 bolts and nuts are still pending. Rivet specifications from shipyards are very heavy, but because of embargoes consignments wanted at the seaboard are being held for weeks in makers' warehouses.

Old Material.—Shipping conditions in the scrap trade show no improvement, and dealers are making little effort to make sales. Shipments from Cleveland producers to local mills and from Cleveland to Youngstown are fairly good, but shipments to the Pittsburgh district are still practically cut off. Heavy melting steel scrap is firm and in good demand. Borings and turnings are weak, owing probably to the inability of dealers to make shipments to Pittsburgh mills. Busheling is quiet and weaker. Cleveland rolling mills are out of the market and their operation is being curtailed by coal shortage. We note the sale to a dealer of 200 tons of busheling at \$28 net. We quote f.o.b., Cleveland, as follows:

Per Gross Ton	
Steel rails	\$27.00 to \$28.00
Steel rails, rerolling	35.00
Steel rails, under 3 ft.	34.50 to 35.50
Iron rails	35.00
Iron car axles	45.00 to 46.00
Steel car axles	45.00 to 46.00
Heavy melting steel	30.00
Cast borings	20.00
Iron and steel turnings	20.00
No. 1 railroad wrought	35.00
Hydraulic compressed steel scrap	28.50 to 29.50
Carwheels	30.00
Relaying rails, 50 lb. and over	50.00 to 60.00
Agricultural malleable	24.00 to 25.00
Railroad malleable	30.00
Steel axle turnings	23.00 to 24.00
Light bundled sheet scrap	24.50 to 25.00
No. 1 cast	30.00
No. 1 busheling	29.50 to 30.00
Per Net Ton	
Railroad grate bars	\$20.00 to \$21.00
Stove plate	20.00 to 21.00

Buffalo

BUFFALO, Feb. 4.

Pig Iron.—Coke shortage and its poor quality are still the most troublesome feature of the market, and with some furnaces the situation is critical in this respect, permitting them to obtain supplies only spasmodically. The tangled and blocked condition of railroad service has again been increased by zero weather which came in place of the prognosticated "thaw," and there appears to be no way of satisfying the urgent demand for quick delivery. Weather conditions in conjunction with the railroad embargoes have caused unprecedented delays in shipments and brought deliveries almost to a standstill. Leading producers state that the situation is the worst ever experienced in this district as regards pig iron and steel output. One of the largest producing interests is obliged to pile iron on its yards from lack of shipping facilities, and reports that several thousand tons have already been piled through inability to secure sufficient cars. Foundries with war orders are crying for iron that it is impossible to get through to them. Some furnaces are taking on business for third-quarter and last-half delivery, but most of them state they are out of the market for the present even for extended delivery. Such contracts as are closed contain the price revision clause, the Government price on day of shipment to govern, with the further provision incorporated by some, if not all, furnaces that they reserve the privilege, if such price is lower than that at present in effect, to cancel the unfilled portion of contract. We continue price schedule current for some time past, f.o.b. furnace, Buffalo, as follows:

No. 1 foundry	\$34.50
No. 2 X	33.50
No. 3 foundry	32.50
Gray forge	32.00
Malleable	35.50
Basic	38.00
Lake Superior charcoal, f.o.b. Buffalo	39.75

Finished Iron and Steel.—Business is still handicapped and crippled by zero weather and the consequent congested freight situation. Plant operation is

restricted by lack of fuel, and about the only orders that can be worked on are for Government material. Local conditions are exceedingly quiet because no material can be obtained from mills except for Government purposes, mills refusing to estimate on new business until conditions become more nearly normal. In one line, however, that of concrete reinforcing bars, the prevailing rule of quietness has not applied, and there has been a noticeable improvement in inquiry and sales, principally for small buildings requiring from 150 to 200 tons of bars. The Ferguson Steel & Iron Co., this city, has been awarded the contract for 900 tons of structural steel for power-house addition for the Pennsylvania General Electric Co. at Erie, Pa., and also the contract for 300 tons for an airplane plant at Cleveland for the Glenn L. Martin Aeroplane Co., for which the Crowell-Lundoff-Little Co. of Cleveland has the general contract.

Old Material.—The railroad situation still keeps the scrap market weighted down with difficulties, with no immediate relief in sight, as intensely cold weather conditions continue. Demand keeps up in large volume for almost all classes of scrap materials, but yard stocks are low and offerings from railroads and other producers are unusually light. There is a pronounced scarcity of cast scrap and malleable scrap, the reason being, according to the theory advanced by dealers, that these two grades of scrap are mixed with and shipped as heavy melting steel, prices now being at a parity with the latter, for which there is an increasing demand, consumers being ready to take practically any tonnage they can buy. There appears to be a strong and growing sentiment on the part of consumers that the Government should fix the prices for the grades of scrap which it has heretofore left untouched, believing that the tendency among dealers is to systematically raise the prices on these unregulated grades to the maximum, which with the heavy demand would soon reach \$30.00, and that an adjustment and fixing of prices on these grades on which latitude has hitherto been allowed would automatically tend to steady the high grades. The price schedule is unchanged from last week and is as follows, per gross ton, f.o.b., Buffalo:

Heavy melting steel	\$30.00
Low phosphorus	40.00
No. 1 railroad wrought	35.00
No. 1 railroad and machinery cast	30.00
Iron axles	\$45.00 to 47.00
Steel axles	45.00 to 47.50
Carwheels	30.00
Railroad malleable	30.00
Machine shop turnings	18.00 to 18.50
Heavy axle turnings	26.00 to 27.00
Clean cast borings	19.00 to 20.00
Iron rails	37.00 to 38.00
Locomotive grate bars	25.00
Stove plate	25.00
Wrought pipe	29.00
No. 1 busheling scrap	30.00
No. 2 busheling scrap	22.00 to 24.00
Bundled sheet stamping scrap	22.00 to 24.00

Philadelphia

PHILADELPHIA, Feb. 5.

A cold wave which struck the East on Monday played further havoc with railroad transportation and with the operation of steel mills. Conditions last week were bad enough, but this week they are worse. Old-timers in the iron and steel business describe them as the most deplorable the industry has ever known. At Johnstown, Pa., Monday morning the temperature was 18 deg. below zero and scarcely a wheel turned in the plant of the Cambria Steel Co. It was not quite so cold in the district nearer to Philadelphia, but it was cold enough to add to the troubles of the over-burdened railroads. Shipments of coal and coke, which had been expected to arrive, could not be delivered. Without exception, the blast furnaces and steel mills of the eastern Pennsylvania district are working from hand to mouth. The trade has given up hope of any improvement of a permanent nature until the last of the winter weather has disappeared. Railroad embargoes are interfering seriously with shipments of all kinds of material, and consumers of pig and steel, as well as those needing coal and coke, are in a serious predicament. Unless relief comes shortly in one form or another, the curtail-

ment of production which Fuel Administrator Garfield sought by his closing order will be much greater.

Pig Iron.—An alarming shortage of low-phosphorus pig iron has been brought to the attention of the War Industries Board in Washington, but there seems to be no immediate relief in sight. The Midvale Steel & Ordnance Co. has been obliged to shut down on the production of acid open-hearth steel and the Bethlehem Steel Co. will follow suit this week. The Tacony Ordnance Corporation, Tacony, Pa., which came into the market several weeks ago for 8700 tons of standard low-phosphorus iron for gun forgings for the United States Army, has not yet been able to fill its requirements and an appeal has been made to Jay C. McLaughlan, who looks after pig iron distribution for the War Industries Board. An effort was first made to obtain a shipment of iron from England and negotiations are also under way for a shipment of Cuban ore, imports of which have been greatly curtailed by the requisitioning of ships by the Shipping Board. It is probable that the Cuban ore will be brought here soon and the iron will be made in a nearby furnace for the Tacony plant. Shipments of pig iron are being greatly hampered by the embargoes in effect on several of the eastern railroads. Furnaces are piling iron which cannot be shipped on contracts, and consumers who are fortunate enough to be able to procure shipping permits from the railroads can now obtain small lots of iron for immediate delivery. Such orders are usually accepted with the stipulation, however, that if the embargo is lifted before the iron is shipped, regular contract customers will be served first. Shipments on contracts are from one to three months behind schedule. The Baldwin Locomotive Works was suffering severely last week from lack of foundry iron, and an order was received from Director General of Railroads McAdoo granting special right of way for iron consigned to the Baldwin plant, which is working night and day to build locomotives to relieve the present shortage of motive power. Small lots of low-silicon or high-manganese or off-grade iron are being sold for as prompt delivery as conditions will permit, as such iron can not always be applied on contracts for standard iron. In many instances, however, contract consumers are taking whatever iron they can get, if it can in any way be fitted to their requirements, often paying differentials above their contract prices for qualities in the iron which are not needed in their work. There is considerable interest among consumers in second-half iron, but only one company in this market is selling for that delivery, so far as is reported. The Thomas Iron Co. has opened its books to regular customers and has booked a fair tonnage in the past week. Interest in basic iron for immediate delivery and for second-half is evidenced by frequent inquiries. The American Bridge Co.'s Pencoyd works at Trenton, N. J., needs steel-making iron so badly that it will take almost anything that is offered. The Griscom-Russell Co., Massillon, Ohio, is inquiring here for 2000 tons of basic for last half and the Stanley Works, New Britain, Conn., is after 500 tons of basic for March delivery. The American Locomotive Co. wants 1000 tons of No. 2 foundry and 200 tons of basic for delivery to its Paterson, N. J., plant over the next two or three months, and the Benjamin Eastwood Co., Paterson, N. J., is inquiring for 800 tons of foundry iron for second and third quarter. We quote standard grades at furnace, with the exception of Virginia iron, for which the delivered price in the Philadelphia district is quoted:

Eastern Pennsylvania No. 1 X.....	\$34.50
Eastern Pennsylvania No. 2 X.....	33.50
Eastern Pennsylvania No. 2 foundry.....	33.00
Virginia No. 2 X (including freight).....	36.77
Virginia No. 2 foundry (including freight).....	36.27
Basic	33.00
Gray forge	32.00
Bessemer	36.30
Standard low phosphorus	53.00
Low phosphorus (copper bearing).....	50.00

Ferroalloys.—The market for ferromanganese is dull. The price remains at \$250, delivered. Spiegeleisen continues to be quoted at \$60, furnace.

Coke.—The coke situation continues very serious. Several furnaces are banked and will continue so until there is some sign of permanent relief. The Midvale Steel & Ordnance Co. and the Bethlehem Steel Co. are

suffering severely at their blast furnaces from coke shortage, and there is no relief in sight. Blast furnaces are running from hand to mouth.

Billets.—There are no transactions in billets and the price remains nominally on the basis of \$50.50, Philadelphia.

Sheets.—Aside from occasional Government orders, there is no activity in sheets. We quote No. 10 blue annealed sheets at 4.25c., Pittsburgh; No. 28 black at 5c., and No. 28 galvanized at 6.25c.

Structural Material.—Up to a late hour to-day (Tuesday) no definite word had been received from Washington by fabricators in this territory who bid on the portable hangers for shipment to France. It develops that the Government will probably order 2000 of these buildings and 1050 more may be bought soon for our Allies. Although no official information was available it was reported in this market that the 2000 buildings, of about 35 tons each, would be split up among the Belmont Iron Works, McClintic-Marshall Co., American Bridge Co., the Fort Pitt Bridge Works, Lewis F. Shoemaker & Co. and the Ferguson Steel & Iron Co. The Ordnance Department is reported to have let contracts for eight ordnance buildings, each containing about 425 tons, but details are lacking. We quote plain material at 3c., Pittsburgh.

Old Material.—Cold weather of the past few days has added to the difficulties of scrap dealers and business is at a standstill. A resumption of active trading will come as soon as the weather moderates and when some of the misunderstandings, which have arisen under the price control plan, have been cleared away. This latter problem will be studied by the new Committee on Iron and Steel Scrap of the American Iron and Steel Institute, of which W. Vernon Phillips of Philadelphia is chairman, and which consists of representatives of various branches of the iron and steel industry, including producers, consumers and distributors. C. A. Barnes, secretary of the American Board of Scrap Dealers, will be appointed secretary of the new committee and will combine his new duties with that of chief of the Bureau of Inspection of the American Board of Scrap Dealers. Low phosphorus heavy melting scrap (0.04 and under in phosphorus) is now quoted in this market at \$40, the maximum allowable under the price control plan. Mills are offering this amount, plus the dealer's commission of 3½ per cent. For low phosphorus scrap not guaranteed as to analysis, \$35, plus the commission, can be obtained. We quote for delivery in the eastern Pennsylvania district as follows:

No. 1 heavy melting steel.....	\$30.00
Steel rails, rerolling	35.00
Low phosphorus heavy, 0.04 and under.....	40.00
Low phosphorus (not guaranteed).....	35.00
Old iron rails.....	\$40.00 to 42.00
Old carwheels	30.00
No. 1 railroad wrought.....	35.00
No. 1 yard wrought	33.00 to 35.00
No. 1 forge fire	26.50 to 27.50
Bundled sheets	26.50 to 27.50
No. 2 busheling	17.00 to 18.00
Turnings (for blast furnace use).....	17.00 to 17.50
Machine shop turnings (for rolling mill use).....	19.00 to 19.50
Cast borings (for blast furnace use).....	17.00 to 17.50
Cast borings (clean).....	20.00
No. 1 cast	30.00
Grate bars	22.50 to 23.00
Stove plate	22.50 to 23.00
Railroad malleable	30.00
Wrought iron and soft steel pipes and tubes (new specifications).....	32.50

Plates.—Production of plates is suffering severely from enforced shutdowns due to coal shortage. Mills have in most cases gotten so far behind that they are now forced to work almost exclusively on Government orders to meet the schedules of the Emergency Fleet Corporation. The Midvale Steel & Ordnance Co., for example, has orders for 67,000 tons of ship plates at one of its mills and has been obliged to turn aside all other business, considerable of which has been offered in the past two weeks. The Lukens Steel Co. is likewise turning down all inquiries. Its production of plates last week was about 50 per cent of capacity. We quote plates at 3.25c., base, Pittsburgh.

Iron and Steel Bars.—Makers of steel bars are not accepting new business, but are devoting their energies to getting out the orders already on their books. Bar

iron mills are seriously hampered by coal shortage and the difficulty in obtaining shipping permits from the railroads. We quote soft steel bars at 2.90c., Pittsburgh, and bar iron at 3.50c., mill, for Western shipments and 3.685c., Philadelphia for Eastern shipments.

British Steel Market

Pig Iron Deliveries Checked by a Shortage of Cars—Other Markets Quiet

LONDON, ENGLAND, Feb. 6—(By Cable.)

Allocations of Cleveland pig iron are being fully maintained, but car shortages are checking deliveries. Semi-finished steel is very quiet. Wire rods are quoted nominal at £30, Liverpool warehouse. The tin plate market is quiet. Ferromanganese is firm.

Solvent naphtha is quoted at 4s. 3d. per gallon with benzol and toluol unchanged. We quote as follows:

Tin plates coke, 14 x 20; 112 sheets. 108 lb., f.o.b. Wales. 31s. 4½d.
Ferromanganese, \$250 c.i.f. for export to America; £26 10s. for British consumption.
Ferrosilicon, 50 per cent, c.i.f. £35 upward.
On other products control prices are as quoted in THE IRON AGE of July 19, 1917, p. 171.

New York

NEW YORK, Feb. 6.

Pig Iron.—New inquiries for pig iron have been received from Italy, South Africa and South America, but no sales have been reported and it is not expected that the export movement will be heavy at any time in the near future on account of the difficulty of getting permits and obtaining vessel tonnage. The American Locomotive Co. is in the market for 1200 tons of various foundry grades for delivery in the next two or three months and a New Jersey foundry is inquiring for 750 tons for delivery in the second and third quarters. Very little iron is being offered for sale for any delivery. On account of the cold weather and embargoes, the shipments are light, and in spite of curtailed production, considerable pig iron is being piled in furnace yards. Some sales are still being made in a very conservative way in the Buffalo district. For early delivery, we quote as follows:

No. 1 X	.....	\$35.25
No. 2 X	.....	34.25
No. 2 Plain	.....	33.75
No. 2 Southern (rail and water)	.....	\$38.75 to 39.25
No. 2 Southern (all rail)	.....	39.15 to 39.65
No. 2 X Virginia	.....	37.00 to 37.25

Ferroalloys.—The ferromanganese market is quiet, more so than had been expected in view of the Brazilian situation. Inquiry is not brisk nor for large quantities. The quotation for the domestic alloy is firm at \$250, delivered, but this has been reported as shaded slightly in the last week. The Middle Western consumer reported recently as inquiring for material for the rest of the first half is said to have bought 600 tons as well as about 1500 tons of spiegeleisen for the same delivery. Another sale of about 800 tons of ferromanganese is reported but details are lacking. Sales of small lots are reported running up to 200 tons at \$250. One representative of a British producer has received notification that licenses have been granted for the shipment to this country of 1500 tons, all on contract. The spiegeleisen market is quiet at \$60, furnace. There is an inquiry for 1000 tons for the second quarter and two other inquiries aggregating 500 for the last half. Ferrosilicon, 50 per cent, is firm and active at \$175 to \$190 for early delivery, depending on the amount involved. Ferrotungsten is quoted at \$2.35 per lb. of contained tungsten, New York, with the ore concentrates selling at between \$20 to \$26 per unit in 60 per cent material, depending on the grade. Ferrovanadium ranges nominally from \$4 to \$5, Pittsburgh, per lb. of contained vanadium for prompt delivery in small lots, but very little is available, large quantities going into steel on Government orders. Ferro-carbon-titanium, 15 to 18 per

cent, is selling at 8c. per lb. in carload lots, 10c. per lb. in ton lots and 12½c. per lb. in lots less than a ton, f.o.b. Suspension Bridge, N. Y.

Finished Iron and Steel.—A portentous development seems likely in the matter of export business. It is reported that growing out of recommendations from this country, purchases on private account must, to secure ship space, be put through as material necessary for the foreign nation's defense. Thus it may pass the embargo against other than war shipments from this country. For example, in the matter of structural material for a French railroad, it is understood that through the French Government the French Commission in Washington will be appealed to on the basis that the material is essential to defense; but the important thing outside of securing vessel space is that being put through as business for the Allies, it will carry prices of the agree-to schedule. Should this procedure be extended very widely and affect similar purchases through a government such as the British, it will be seen that less and less export business of the immediate future will be done at other than so-called government prices. That government intervention is important is indicated by such an instance as 1000 tons of wire rods, sold months ago for shipment abroad and although paid for, still reposing at one of our Atlantic seaports. Generally the market is featureless, except that not only are many producers unconcerned about new business but they are returning current orders, asking their customers to hold up for a while, if at all possible. About the only new structural work learned of covers 500 tons of bridge work for the New Amsterdam Gas Co. Awards include: 1000 tons for two alcohol plants in Pennsylvania for the government, awarded to the Hay Foundry & Iron Works; 700 tons for the National Lead Co., in Brooklyn, awarded to the Passaic Rolling Mill Co. and 250 tons for the Morse Dry Dock & Repair Co. and 100 tons for the Delaware & Hudson Railroad, both awarded to the American Bridge Co. We quote mill shipments of steel bars at 3.095c., New York; shapes 3.195c., plates 3.445c. and bar iron 3.695c., New York. Out of store prices are 1c. higher.

Old Material.—The extremely cold weather of this week has again checked shipments of old material, which had improved slightly the latter part of last week. The latest regulation in regard to demurrage restores the so-called average agreement for cars held for unloading and allows 48 hr. for either loading or unloading and 24 hr. free time on cars held for any other purpose permitted to carriers. It fixes rates after the two days free time to \$3 per day for four days, \$6 per day for the three succeeding days and \$10 per day thereafter. The market for cast iron material is strong, reflecting the scarcity of pig iron. We quote prices of brokers as follows to New York producers and dealers, per gross ton, New York:

Heavy melting steel	.....	\$26.25 to \$27.75
Rerolling rails	.....	32.80
Relaying rails	.....	60.00 to 70.00
Iron and steel car axles	.....	45.30
No. 1 railroad wrought	.....	32.80
Wrought-iron track scrap	.....	32.80
No. 1 yard wrought long	.....	32.80
Light iron	.....	9.00 to 10.00
Cast borings (clean)	.....	17.80 to 18.80
Machine-shop turnings	.....	17.80 to 18.80
Mixed borings and turnings	.....	14.50 to 15.50
Wrought-iron pipe (1 in. minimum diameter), not under 2 ft. long	.....	29.00 to 30.00

Dealers in New York and Brooklyn are quoting as follows to local foundries, per gross ton, but for delivery to cupola platforms of Brooklyn foundries about \$3 more is quoted:

No. 1 machinery cast	.....	\$27.80 to \$28.50
No. 1 heavy cast (columns, building materials, etc.)	.....	25.00 to 26.00
No. 2 cast (radiators, cast boilers, etc.)	.....	24.00 to 25.00
Stove plate	.....	23.00 to 24.00
Locomotive grate bars	.....	23.00 to 24.00
Malleable cast (railroad)	.....	27.80 to 28.50
Old carwheels	.....	27.80 to 28.50

Cast-Iron Pipe.—A New York commission house has sent out an inquiry for 1300 tons of cast-iron pipe for export. Large tonnages could be sold for export if there was any prospect for obtaining vessel tonnage, but the

outlook for any foreign movement is unfavorable. Private buying is fairly active. On 1000 tons for the city of Buffalo, the United States Cast Iron Pipe & Foundry Co. was low bidder at \$53.40 for 6 to 24-in. and \$57 for 4-in. The Government prices continue as follows: \$55.35, New York, for 6-in. and heavier, and \$58.35 for 4-in.; \$65.35 for 3-in. and \$1 additional for class A and gas pipe.

MUNITION STEEL EXPORTS

Raw Steel Over 2,000,000 Tons in 1917—Steel-Bar Outgo Very Large

THERE is no let-up in the outgo from this country of munition or shell steel. Figures that a year and a half ago seemed gigantic are now dwarfed by those representing the semi-finished or raw steel and the steel-bar exports.

Exports of Billets, Ingots and Blooms

The culmination in the exports of billets, ingots and blooms from the United States was reached in October and December when 204,724 and 204,555 gross tons respectively were sent out. For the 12 months of 1917, the total exports were 2,013,459 tons, or far in excess of the total for 1916 or 1915 and but little less than the total for both of those years, which was 2,068,000 tons.

The following table, compiled from Government data, gives a comprehensive idea of the exports of billets, ingots and blooms from the United States for the 41 months of the war to Jan. 1, 1918 and the destination of this raw steel, assuming the outgo in the first 5 months of the war to have been small:

Table of Exports of Billets, Ingots and Blooms from the United States—Gross Tons

Year	Total	Destination			
		Great Britain	France	Italy	Canada
1915.....	560,728	359,125	.....	.....	58,486
1916.....	1,508,729	289,414	902,499	.....	105,420
1917.....	2,013,459	610,617*	560,957*	349,622*	141,532*
Total..	4,082,916	1,259,156	1,463,456	349,622	305,438

*To Nov. 1, 1917, only; data unavailable subsequent to this.

Largely for the purpose of making shells of large caliber, over 4,000,000 tons of steel had been shipped to our allies up to less than two months ago.

The analysis of the destination presents some interesting facts. Early in the war, Great Britain took the largest proportion, then France absorbed two-thirds of the outgo in 1916. In 1917, Great Britain's share again mounted to the highest total while Italy was furnished a surprising amount. Canada's absorption has been steady.

Bar Steel for War Purposes

Steel bars have been a prominent exportation from which small shells have been made, and the exports from the United States have been strikingly large. The total for 1917, was 626,466 gross tons which is somewhat less than in the same period in 1916. The following table shows these exports for the 41 months of the war to Jan. 1, 1918, including those to France from Great Britain.

Table of Steel-Bar Exports from the United States and Great Britain—Gross Tons

	From the United States	From Great Britain		Total from Great Britain
		to France	to other countries	
Aug. to Dec., 1914.....	.....	11,530	.....	73,437
Calendar year, 1915...	426,002	349,295	.....	489,191
Calendar year, 1916...	774,455	519,883	.....	617,159
Calendar year, 1917...	626,466	350,000*	.....	409,386*
Total.....	1,826,923	1,230,703	.....	1,589,173

*To Dec. 1, 1917, only, and estimated, as detailed destination is not now reported.

As the large majority of the steel-bar exports from the United States are going to France, it will be seen that these combined with those from Great Britain to France amounted to over 3,000,000 tons to Jan. 1, 1918.

For all of 1913, the total steel-bar exports from the United States were only 211,716 tons.

Total Steel for Shells

An idea of the total steel that is being spread over the Western front in the shape of shells is obtained by adding together the exports of raw steel and steel bars from the United States to the British exports of steel bars to France. A summation of them is as follows:

	Gross Tons
War exports of raw steel from the United States to Jan. 1, 1918.....	4,082,916
War exports of steel bars from the United States to Jan. 1, 1918.....	1,826,923
Total from the United States.....	5,909,839
War exports of steel bars from Great Britain to Dec. 1, 1917.....	1,230,703
	7,140,542

This makes a total of over 7,000,000 tons—a stupendous amount. But the actual is much more. No account is taken here of the total exports from Canada nor of the great amounts of steel made right in France or in England and shipped to France and Italy. Added to all this is the very large total of steel consumed in making finished shells in this country, Canada and Great Britain.

Sharon Steel Hoop Co. Buys Mary Furnace

Last week the Sharon Steel Hoop Co., operating open-hearth steel works at Sharon, Pa., and also open-hearth steel works, sheet and plate mills at Lowellville and Youngstown, Ohio, bought the Mary blast furnace at Lowellville, operated for many years by the Ohio Iron & Steel Co. The stack, which is 18 x 85 ft., was originally built in 1845, rebuilt in 1898, and again remodeled and enlarged about two years ago. It has a daily capacity of about 350 tons of iron. It is understood that payment is to be made in the stock of the Sharon Steel Hoop Co. and this company is to increase its capital from \$10,000,000 to \$15,000,000. Possession of the furnace was taken on Feb. 1. Since the Youngstown Iron & Steel Co. built its open-hearth steel plant at Lowellville, about three years ago, it has been taking hot metal from the Mary furnace for its open-hearth furnaces, and when the Sharon Steel Hoop Co. took over the Youngstown Iron & Steel Co. early last year this was continued. The acquisition of this furnace will go far to make the Sharon Steel Hoop Co. self-contained in pig iron, but it will still be a buyer in the market, largely for its open-hearth furnaces at Sharon. The organization of the Ohio Iron & Steel Co. will not be changed. Robert Bentley, who continues as president, will look after its ore, coal, coke and limestone interests.

The Sharon Steel Hoop Co. is considering some extensive additions, but these may not be undertaken this year owing to the high cost of labor and materials and unsatisfactory deliveries. The plans include the erection of a large blast furnace and a by-product coke plant at Sharon and also the building of houses for workmen. Severn P. Ker, president of the company, states that such additions are contemplated, but that nothing has been done toward authorizing them.

New Railroad Shops

The Wisconsin & Michigan Railroad Co., Peshtigo, Wis., which recently was purchased at foreclosure sale by John Marsch and associates, Chicago, has decided to move its general headquarters to Menominee, Mich., where all machine and repair work and other activities will be concentrated. A tract of nine acres in Menominee has been purchased as a site for new shops, round-houses, etc. The company is contemplating an entrance into the ore-carrying business and proposes to build a dock on Green Bay, Menominee, on the site of a former steamship dock, which will provide adequate facilities for any Great Lakes ore-carrier without any considerable amount of dredging. It is intended to start work on the new terminal at once. S. N. Harrison is general manager.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery							
Copper, New York		Tin, New York	Lead, New York		St. Louis		Spelter, New York
Jan.	Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis
30.....	23.50	23.50	85.00*	7.00	6.85	7.87½	7.62½
31.....	23.50	23.50	85.00*	7.00	6.85	7.87½	7.62½
Feb.							
1.....	23.50	23.50	85.00*	7.00	6.85	8.00	7.75
2.....	23.50	23.50	85.00*	7.00	6.85	8.00	7.75
5.....	23.50	23.50	85.00*	7.00	6.85	8.00	7.75

*Nominal.

NEW YORK, Feb. 6.

Monday was again a general holiday and there was no market. There have been no important developments in copper, which continues moderately active at Government prices. Tin for spot delivery is still unobtainable and nominal. Lead is extremely dull but firm. Spelter is quiet and perhaps a little stronger. Antimony continues dead.

New York

Copper.—From some quarters, particularly the jobbing trade, a distinct shortage of spot copper is reported, due to the transportation situation and other causes. One dealer has none at all. That the present railroad situation, coupled with continued storms and low temperatures, may seriously affect the supply of raw copper, as blister copper and matte, at the Eastern refineries is the subject of some anxious comment. While the situation at the moment is not serious, the possibilities of a temporary shortage are realized if present conditions continue. The market is quiet at the Government prices of 23.50c. for carload or large lots, with 24.67½c. asked for jobbing lots. There seems to be plenty of metal in sight for all needs, Government and other, but the difficulty is now to get it to the consumers. Exports in January are estimated at 37,000 tons.

Tin.—Government commandeering of tin continues. About 500 tons of Banca, which arrived late last week on two steamers, was taken but it is expected that nearly all of it has been or will be restored to the owners later, if they are legitimate ones. Late last week there was a little business done in future tin but the volume was not large nor were there many sellers. There were no sales on Monday, of course, but yesterday there was a good-sized inquiry from two buyers and a moderate amount of business was done, all in futures. No prompt or nearby metal is obtainable, and spot Straits continues nominal at 85c., New York. Nearby metal is only that arriving daily and it is all applied to old contracts. Deliveries of tin for January were 4642 tons, of which 3192 came East from Pacific ports. Stocks and landing Jan. 31 were 767 tons. Arrivals in February have not yet been reported. The London market is again stronger at £301 per ton yesterday for spot Straits, against £299 10s. a week ago.

Lead.—The market is featureless and without interest. It is quite firm but dull and practically nominal at 7c., New York, or 6.85c., St. Louis, for early delivery in the outside market with the leading interest still quoting 6.75c., New York, but accepting business only for March-April delivery. Demand is very light. There has been some interest in spot lead and carloads have sold at 7.50c., New York. Railroad congestion is still the controlling factor causing stocks in New York to decline daily. There has been some interest in lead in bond but not much business.

Spelter.—Rumors persist that a price of 12c. per lb. has been fixed by the Government on Grade A zinc. This is probably true and merely lacks official promulgation. The market for prime Western is quiet and firm at about 8c., New York, or 7.75c., St. Louis, for prompt and early delivery, with slight premiums for advanced positions. There is no large demand but sales of modest proportions are reported at these levels. Un-

doubtedly, large quantities of spelter of all grades are going into consumption on Government contracts. Railroad congestion is a serious factor in all branches of the industry. In the retail market quotations range as high as 8.75c. to 9c., New York. One large producer predicts a scarcity of spelter ultimately, due to reduced output and other causes. Some smelters in the West are faced with a fuel shortage, including those making sulphuric acid.

Antimony.—The market is dead at 14c. to 14.25c., New York, duty paid, for prompt delivery of Chinese and Japanese material. Further Government inquiry is reported but such orders are very quietly placed.

Aluminum.—No. 1 virgin metal, 98 to 99 per cent pure, continues in poor demand and unchanged at 36c. to 38c., New York, for prompt and early delivery.

Old Metals.—The market is quiet. Dealers' selling prices are nominally as follows:

	Cents per lb.
Copper, heavy and crucible (nominal).....	23.50
Copper, heavy and wire (nominal).....	23.50
Copper, light and bottoms.....	21.00 to 21.50
Brass, heavy.....	17.00 to 17.25
Brass, light.....	12.25 to 12.50
Heavy machine composition.....	24.00 to 24.25
No. 1 yellow rod brass turnings.....	13.00 to 13.50
No. 1 red brass or composition turnings.....	19.00 to 20.00
Lead, heavy.....	6.50
Lead, tea.....	5.25
Zinc.....	6.00

Chicago

FEB. 5.—For copper there is a large and insistent demand, mainly for Government requirements, and in some cases shops have shut down because they could not get metal. At the mines and refineries there are large stocks, most of it sold, but intervening between producers and consumers is the transportation problem. Tin has become slightly easier with the knowledge that additional supplies can be had in 10 days' shipment from New York. Lead and spelter are inactive, though the latter is a trifle stronger. Tin is quoted at 85c. to 90c.; spelter at 7.80c. to 7.90c. Red brass is held at 20c.

St. Louis

FEB. 4.—Nonferrous metals have been quiet with little variation in quotations, the close to-day being at 7c. for lead in carload lots and 7.75c. for spelter. There is some uncertainty prevailing in the market pending the announcement of the Government price on zinc, which is expected, but a fixed price is expected to steady and reassure both buyers and sellers. In less than carload lots, the prices are: Lead, 7.50c.; spelter, 8.50c.; tin, 90c.; copper, 25.12c.; Asiatic antimony, 18c. In the Joplin district, the severe weather continues to interfere with operations. The basic price on zinc ore ranged from \$50 to \$67.50 per ton, basis of 60 per cent metal, with the average price for the district for the week at \$56 per ton. In calamine, basis range, the price was \$32 to \$34 per ton with the average for the district on 40 per cent basis ore \$33 per ton. Lead was a little firmer, basis of 80 per cent metal, with the price at \$80 per ton and the average for the week the same figure. On miscellaneous scrap metals we quote dealers' buying prices as follows: Zinc, 5c.; lead, 5.50c.; tea lead, 5c.; light brass, 10c.; heavy yellow brass, 14c.; heavy red brass and light copper, 19.50c.; heavy copper and copper wire, 20c.; pewter, 25c.; tinfoil, 50c.

By invitation of the war department, W. A. Thiel, superintendent of the gun department Winchester Repeating Arms Co., New Haven, Conn., recently presented to President Wilson as a personal gift the first gun turned out in this country of the model 1917 U. S. A. rifle, the Americanized Enfield gun. The gun presented to the President was a plain service gun and the statement was made that the company is now turning out 2000 rifles a day, 800 more than were ever turned out for the British Government in a single day.

The Brier Hill Steel Company will get electric power for its new plate mills at Youngstown, Ohio, from the Republic Heat & Light Co. plant at Lowellville, 10 miles away. The power will be transmitted over high tension lines.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight rates from Pittsburgh on iron and steel articles, aside from wrought iron and steel pipe in carloads, per 100 lb., New York, 19.5c.; Philadelphia, 18.5c.; Boston, 21.5c.; Buffalo, 11.6c.; Cleveland, 13.5c.; Cincinnati, 18.5c.; Indianapolis, 20c.; Chicago, 21.5c.; St. Louis, 27c.; Kansas City, 47c.; minimum carload, 36,000 lb.; St. Paul, 40c.; minimum carload, 36,000 lb.; Denver, 79c.; minimum carload, 36,000 lb.; Omaha, 47c.; minimum carload, 36,000 lb.; New Orleans, 30.7c.; Birmingham, 46c.; Pacific Coast, 75c.; minimum carload, 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is 90c., minimum carload, 40,000 lb.; and 85c., minimum carload, 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 40c. per 100 lb., minimum carload 46,000 lb.; to Omaha, 40c., minimum carload 46,000 lb.; to St. Paul, 35.5c., minimum carload 46,000 lb.; Denver, 79c., minimum carload 46,000 lb. A 3 per cent transportation tax now applies.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in. angles, 3 to 6 in. on one or both legs, 1/4 in. thick and over, and zeos, structural sizes, 3c.

Wire Products

Wire nails, \$3.50 base per keg; galvanized, 1 in. and longer, including large-head barb roofing nails taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire, \$3.35 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.25; galvanized wire, \$3.95; galvanized barb wire and fence staples, \$4.35; painted barb wire, \$3.65; polished fence staples, \$3.65; cement-coated nails, \$3.40 base; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 47 per cent off list for carload lots, 46 per cent for 1000-rod lots, and 45 per cent off for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large rivets \$4.65 base
7/16 in. x 6 in. smaller and shorter rivets, 45-10 per cent off list
Machine bolts h.p. nuts, 5/8 in. x 4 in.:
Smaller and shorter, rolled threads 50-10-5 per cent off list
Cut threads 50-5 per cent off list
Larger and longer sizes 40-10 per cent off list
Machine bolts c.p.c. and t. nuts, 5/8 in. x 4 in.:
Smaller and shorter 40-10 per cent off list
Larger and longer 35-5 per cent off list
Carriage bolts, 5/8 in. x 5 in.:
Smaller and shorter, rolled threads 50-5 per cent off list
Cut threads 40-10 per cent off list
Larger and longer sizes 40 per cent off list
Lag bolts 50-10 per cent off list
Plow bolts, Nos. 1, 2, 3 50 per cent off list
Hot pressed nuts, sq., blank 2.50c. per lb. off list
Hot pressed nuts, hex., blank 2.30c. per lb. off list
Hot pressed nuts, sq., tapped 2.30c. per lb. off list
Hot pressed nuts, hex., tapped 2.10c. per lb. off list
C.p.c. and t. sq. and hex. nuts, blank 2.25c. per lb. off list
C.p.c. and t. sq. and hex. nuts, tapped 2.00c. per lb. off list
Semi-finished hex. nuts:
5/8 in. and larger 60-10-10 per cent off list
3/4 in. and smaller 70-5 per cent off list
Stove bolts 70-10 per cent off list
Stove bolts 2 1/2 per cent extra for bulk
Tire bolts 50-10-5 per cent off list
The above discounts are from present lists now in effect.
All prices carry standard extras.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$57; chain rods, \$65; screw, rivet and bolt rods and other rods of that character, \$65. Prices on high carbon rods are irregular. They range from \$70 to \$80, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16 in. x 4 1/2 in. and heavier, per 100 lb., \$3.90, in lots of 200 kegs of 200 lb. each, or more; track bolts, \$4.90. Boat spikes, \$5.25 per 100 lb., f.o.b. Pittsburgh.

Terne Plate

Effective Nov. 7 prices on all sizes of terne plates are as follows: 8-lb. coating, 200 lb., \$15 per package; 8-lb. coating, I. C., \$15.30; 12-lb. coating, I. C., \$16.75; 15-lb. coating, I. C., \$17.75; 20-lb. coating, I. C., \$19; 25-lb. coating, I. C., \$20; 30-lb. coating, I. C., \$21; 35-lb. coating, I. C., \$22; 40-lb. coating, I. C., \$23 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.90c. from mill, and 4.50c. to 5c. from warehouse in small lots for prompt shipment. Refined iron bars, 3.50c. in carload and larger lots, f.o.b. mill.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card, as announced Nov. 5 by the Government on steel pipe, those on iron pipe being the same as quoted for some time:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/2, 3/4 and 1	44	17 1/2	1/2 and 3/4	23	+4
1 1/2	48	33 1/2	3/4	24	+3
3/4 to 3	51	37 1/2	1 1/2	28	10
			3/4 to 1 1/2	33	17
Lap Weld			Lap Weld		
2	44	31 1/2	1 1/2	18	3
2 1/2 to 6	47	34 1/2	1 1/2	25	11
7 to 12	44	30 1/2	2	26	12
13 and 14	34 1/2	..	2 1/2 to 6	28	15
15	32	..	7 to 12	25	12
Butt Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
1/2, 3/4 and 1	40	22 1/2	1/2, 3/4 and 1	22	5
1 1/2	45	32 1/2	1 1/2	27	14
3/4 to 1 1/2	49	36 1/2	3/4 to 1 1/2	33	18
2 to 3	50	37 1/2			
Lap Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
2	42	30 1/2	1 1/2	19	4
2 1/2 to 4	45	33 1/2	1 1/2	25	11
4 1/2 to 6	44	32 1/2	2	27	14
7 to 8	40	26 1/2	2 1/2 to 4	29	17
9 to 12	35	21 1/2	4 1/2 to 6	28	16
			7 to 8	20	8
			9 to 12	15	3

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent. Prices for less than carloads are four (4) points lower basing (higher price) than the above discounts on black and 5 1/2 points on galvanized.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are seven (7) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are nine (9) points lower (higher price).

Boiler Tubes

The following are the prices for carload lots, f.o.b. Pittsburgh, announced Nov. 13, as agreed upon by manufacturers and the Government:

Lap Welded Steel		Charcoal Iron	
3 1/2 to 4 1/2 in.	34	3 1/2 to 4 1/2 in.	12 1/2
2 1/2 to 3 1/4 in.	24	3 to 3 1/4 in.	+ 5
2 1/4 in.	17 1/2	2 1/2 to 2 3/4 in.	+ 7 1/2
1 3/4 to 2 in.	13	2 to 2 1/4 in.	+ 22 1/2
		1 3/4 to 1 1/2 in.	+ 35
Standard Commercial Seamless—Cold Drawn or Hot Rolled		Standard Commercial Seamless—Cold Drawn or Hot Rolled	
Per Net Ton		Per Net Ton	
1 in.	\$340	1 1/2 in.	\$220
1 1/4 in.	280	2 to 2 1/2 in.	190
1 3/4 in.	270	2 1/2 to 3 1/4 in.	180
1 1/2 in.	220	4 in.	200
		4 1/2 to 5 in.	220

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department, which will be subject to special negotiation.

Sheets

Makers' price for mill shipments on sheets of United States standard gage in carload and larger lots, are as follows. 30 days net or 2 per cent discount in 10 days:

Blue Annealed—Bessemer		Blue Annealed—Bessemer	
Cents per lb.		Cents per lb.	
Nos. 8 and heavier	4.20	Nos. 17 to 21	4.80
Nos. 9 and 10	4.25	Nos. 22 and 24	4.85
Nos. 11 and 12	4.30	Nos. 25 and 26	4.90
Nos. 13 and 14	4.35	No. 27	4.95
Nos. 15 and 16	4.45	No. 28	5.00
		No. 29	5.10
		No. 30	5.20
Box Annealed, One Pass Cold Rolled—Bessemer		Galvanized Black Sheet Gage—Bessemer	
Cents per lb.		Cents per lb.	
Nos. 10 and 11	5.25	Nos. 10 and 11	5.25
Nos. 12 and 14	5.35	Nos. 12 and 14	5.35
Nos. 15 and 16	5.50	Nos. 15 and 16	5.50
Nos. 17 to 21	5.65	Nos. 17 to 21	5.65
Nos. 22 and 24	5.80	Nos. 22 and 24	5.80
Nos. 25 and 26	5.95	Nos. 25 and 26	5.95
No. 27	6.10	No. 27	6.10
No. 28	6.25	No. 28	6.25
No. 29	6.50	No. 29	6.50
No. 30	6.75	No. 30	6.75
Tin-Mill Black Plate—Bessemer		Tin-Mill Black Plate—Bessemer	
Cents per lb.		Cents per lb.	
Nos. 15 and 16	4.80	Nos. 15 and 16	4.80
Nos. 17 to 21	4.85	Nos. 17 to 21	4.85
Nos. 22 to 24	4.90	Nos. 22 to 24	4.90
Nos. 25 and 27	4.95	Nos. 25 and 27	4.95
No. 28	5.00	No. 28	5.00
No. 29	5.05	No. 29	5.05
No. 30	5.05	No. 30	5.05
Nos. 30 1/2 and 31	5.10	Nos. 30 1/2 and 31	5.10

IRON AND INDUSTRIAL STOCKS

Market Rouses Somewhat from Month-Long Inactivity—Values Slightly Increased

After a dull January the stock market came to life on the final day of the month, when activity was stimulated by the discovery that the floating supply of stocks with which to cover short sales was small. An accompanying activity in investment buying was attributed to the public's faith in values in the face of further heavy war loans and taxes, and to the Steel Corporation's action in maintaining its annual rate of 17 per cent dividend on its common stock. All steel and metal-working companies' shares advanced, the greatest increments being in the larger issues; U. S. Steel, com., $5\frac{1}{2}$ points; pref., $3\frac{1}{4}$; Bethlehem Steel, com., $4\frac{1}{2}$; class B, $3\frac{1}{8}$; 8's pref., 4; Midvale Steel, $1\frac{1}{8}$.

The range of prices on active iron and industrial stocks from Tuesday of last week to Wednesday of this week was as follows:

Allis-Chalm. com.	19% - 23%	Int. Har. of N. J.	
Allis-Chalm. pf.	74 - 75 $\frac{1}{2}$	com.	119 - 122
Am. Can. com.	37% - 39	Int. Har. of N. J.	
Am. Can. pf.	90 - 90%	pf.	108 $\frac{1}{2}$ - 109
Am. Car & Fdry.		Int. Har. Corp.	
com.	71% - 73 $\frac{1}{2}$	com.	68 $\frac{1}{2}$ - 72
Am. Car & Fdry.		Lack. Steel	76 $\frac{1}{2}$ - 79 $\frac{1}{4}$
pf.	110 - 110 $\frac{1}{2}$	Lake Super. Corp.	13 $\frac{1}{4}$ - 14
Am. Loco. com.	56% - 58 $\frac{1}{2}$	Midvale Steel	43 $\frac{1}{4}$ - 45 $\frac{1}{2}$
Am. Loco. pf.	96 $\frac{1}{2}$ - 97	Nat.-Acme	30 - 32
Am. Radiator com.	255	Nat. En. & Stm.	
Am. Ship. com.	89 $\frac{1}{4}$	com.	43% - 45 $\frac{1}{2}$
Am. Ship. pf.	85	N. Y. Air Brake	125 - 131 $\frac{1}{2}$
Am. Steel Fdries.	60 - 62%	Nova Scotia Stl.	66 - 69
Bald. Loco. com.	60 $\frac{1}{2}$ - 64 $\frac{1}{2}$	Press. Steel com.	62 $\frac{1}{2}$ - 63
Bald. Loco. pf.	96 $\frac{1}{2}$ - 97	Ry. Stl. Spr. com.	51 $\frac{1}{2}$ - 53 $\frac{3}{4}$
Beth. Steel com.	79 - 80 $\frac{1}{2}$	Republic com.	75% - 79
Beth. Stl. Cl. B.	75% - 80 $\frac{1}{2}$	Republic pf.	94 - 95%
Case (J. L.) pf.	82	Sloss com.	41 $\frac{1}{2}$ - 43
Cent. Fdry. com.	34 $\frac{1}{2}$	Superior Steel	34 $\frac{3}{8}$ - 37%
Cent. Fdry. pf.	43 $\frac{1}{4}$ - 45	Un. Alloy Steel	39
Chic. Pn. Tool.	48 $\frac{1}{2}$ - 50	U. S. Pipe com.	14 - 15
Colo. Fuel	38 $\frac{1}{2}$ - 39	U. S. Pipe pf.	47% - 47 $\frac{3}{4}$
Cruc. Steel com.	56 - 58	U. S. Steel com.	92% - 98 $\frac{1}{2}$
Cruc. Steel pf.	86 - 89	U. S. Steel pf.	110 - 112 $\frac{3}{8}$
Gen. Electric	130 $\frac{1}{2}$ - 140	Va. I. C. & Coke	53 - 56
Gt. No. Ore Cert.	27 - 28 $\frac{1}{4}$	Warwick	8 $\frac{1}{4}$
Gulf States Stl.	89 - 93	Westingh. Elec.	40 $\frac{1}{4}$ - 42 $\frac{1}{2}$

Dividends

The American Radiator Co., quarterly, 3 per cent and extra 4 per cent in Liberty Bonds on the common, payable March 30, and 1 $\frac{1}{4}$ per cent on the preferred, payable Feb. 15.

Deere & Co., quarterly, 1 $\frac{1}{4}$ per cent on the preferred, payable March 1.

The Eastern Steel Co., quarterly, 2 $\frac{1}{2}$ per cent on the common, payable April 15, and 1 $\frac{1}{4}$ per cent on the first and second preferred, payable March 15.

The Inland Steel Co., quarterly, 2 per cent, payable March 1.

The International Harvester Co. of New Jersey, quarterly, 1 $\frac{1}{4}$ per cent on the preferred, payable March 1.

The International Harvester Corporation, quarterly, 1 $\frac{1}{4}$ per cent on the preferred, payable March 1.

The Pittsburgh Steel Co., quarterly, 1 $\frac{1}{4}$ per cent on the preferred, payable March 1.

The Savage Arms Corporation, quarterly, 1 $\frac{1}{2}$ per cent on the common, 1 $\frac{1}{4}$ per cent on the first preferred and 1 $\frac{1}{2}$ per cent on the second preferred, all payable March 15.

The Standard Sanitary Mfg. Co., quarterly, 1 $\frac{1}{2}$ per cent on the common and 1 $\frac{1}{4}$ per cent on the preferred, payable Feb. 9.

The Superior Steel Corporation, quarterly, 2 per cent on the first and second preferred, payable Feb. 15.

Report of Thomas Iron Co.

The report of the Thomas Iron Co., Hokendauqua, Pa., for the year ended Dec. 31, 1917, states that its furnace operations have been much restricted on account of shortage of fuel. President W. A. Barrows, Jr., says in part:

We have been compelled frequently to slow down and have had to bank furnaces at times. The Hellertown plant has been idle since September, due to failure to secure coke contracted for. As a result of decreased production we have been unable to fill all our contracts in 1917, but arrangements have been made to deliver the deferred tonnage in 1918. Orders for all grades on our books Jan. 1, 1918, amounted to 113,981 tons. The average price of these sales is well above the Government price. We have large stocks of ore at all our furnaces, and have contracted for sufficient coke to convert same into pig iron. All tonnages called for by the Government have been cared for and over 85 per cent of our orders are from concerns doing work for the Government. We trust transportation conditions will improve so that we can operate

full during 1918 and permit of our filling our contracts promptly and in addition secure more economical operation. The limit placed on our selling price precludes large profits and unless operating difficulties are relieved the outlook is far from bright.

Your management has considered it wise, since our financial condition permitted it last year, to make some very heavy deductions from earnings for the retirement of obsolete equipment and to restore depleted reserves set up by our accountants to care for extraordinary repairs and renewals and development accounts. Due to not charging a sufficiently high rate per ton on pig iron made in the past, these reserve deficits have accrued. By the deduction made the deficits are restored, and we are now charging a sum per ton of iron made that we believe will fully provide for these items and prevent future deficits.

The board of directors declared a dividend of 3 per cent of the profits of the six months ending Dec. 31 last, payable Feb. 1, 1918. The following statement shows distribution of earnings for the past year:

Amount set aside to restore depleted extraordinary repairs and renewals and development reserves as of Jan. 1, 1917	\$131,535.49
Amount set aside for extraordinary repairs and renewals and development accounts and expended in 1917	250,684.20
Amount charged off for obsolete equipment retired during the year	110,131.91
Amount charged off for depreciation and depletion for year 1917	126,045.80
Amount reserved for income and excess profits tax	58,210.67
Amount declared in dividends	124,996.50
Balance to surplus	194,628.38
	\$996,232.95

The income account shows revenue from sales amounting to \$3,785,894.06; cost of sales, \$3,289,615.44; gross profit on sales, \$496,278.62; total cost of selling and administration, etc., \$281,472.72; net operating profit, \$214,805.90. Income from other sources including \$159,163.53 from securities owned, amounted to \$182,165.89. The balance to surplus was \$194,628.38.

Prospects of Dayton Coal, Iron & Railway Co.

President H. S. Matthews of the Dayton Coal, Iron & Railway Co. has submitted to Fanning, Buck & Co., brokers, New York, a report on the resources and prospects of the Dayton Coal, Iron & Railway Co., organized under the laws of Delaware. The company's plant at Dayton, Tenn., includes two blast furnaces, one of 150 tons per day capacity and the other of 225 tons; 374 beehive coke ovens with a capacity of from 400 to 450 tons per day; about 4000 acres of ore lands containing both brown and red ores; 17 miles of standard gage railroad and considerable rolling stock. The company is now spending about \$100,000 in improvements and additions.

President Matthews says in part:

Dayton furnace No. 1 has a record cost of \$11.48 per ton for a continuous run of 161,649 tons of pig iron. The commissary, house rents, etc., not included, amounted to 35 cents per ton of iron, leaving a net cost per ton of iron of \$11.13 per ton. The Dayton property, by manufacturing its own coke and buying a portion of its ore requirements at present market prices, should produce pig iron at a cost not exceeding \$20 per ton, based upon present selling value of ore and the wage scale prevailing throughout that section.

The company has the advantage of securing immediate cash from daily marketing of iron, which runs into money very fast, thus reducing the large working capital requirements. I have contracted for the sale of 3000 tons of pig iron at \$42.50 to \$45 per ton through the Matthew Addy Co. of Cincinnati, for delivery from January to July, 1918. Our policy would be to contract for the entire output for the first half of 1918 at the Government fixed price of from \$33 to \$37.50 per ton f.o.b. the furnace. The production capacity of the two Dayton furnaces is practically 100,000 to 125,000 tons of pig iron per annum, but, to be conservative, I estimate sales the first year of production of 70,000 tons of pig iron at a profit of \$13 per ton, showing a total net profit of \$910,000. As the dividend requirements on the preferred stock amount to only \$160,000 per year, the estimated annual net earnings point to a large surplus to be applied to dividends on the common stock. In addition to the above sources of income, should the company conclude to erect by-product coke ovens for the recovery of numerous by-products from the coal consumed in the manufacture of its coke, and should also in-

still a steel making plant on its property, there should be a still greater expansion of its earning power.

The Matthews Iron & Steel Co. of Rome, Ga., and the Dayton Coal, Iron & Railway Co. of Dayton, Tenn., will be under the same management, and, according to plan, the majority of the stock of the Matthews Iron & Steel Co. will be held by the Dayton company. The Matthews company can produce a surplus of red and brown ores, which, supplemented by the Dayton ores, will supply the Dayton and Rome furnaces.

The excess coal production by the Dayton company will, with a few improvements, supply the Matthews company, and, by an exchange of ore and coke, both properties will be self-contained, with a consequent reduction in costs. Merchant furnaces depending upon the open market for supply of ore or coke are compelled to pay the prevailing market prices, which, in times such as the present, always carry a substantial profit to the producer.

Inland Steel Earnings

Inland Steel Co. has issued its annual report for year ended Dec. 31, 1917. Comparison of income account for the year follows:

	1917	1916	1915
Net earnings	\$21,240,783	\$11,241,046	\$4,414,139
Other income	124,431	78,885	
Total income	\$21,240,783	\$11,365,477	\$4,493,024
Depreciation, etc.	1,769,166	539,241	323,920
Interest	436,549	375,450	381,690
Federal taxes	8,500,000		
Net profits	\$10,535,068	\$10,450,786	\$3,787,414
Dividends	1,999,820	799,908	599,886
Surplus	\$8,535,248	\$9,650,878	\$3,187,528

*Equal to \$42.14 a share on \$24,997,000 capital stock.

At the annual meeting of the company, retiring directors were re-elected, and at the meeting of directors the retiring officers were re-elected.

Carbon Steel Co. Quarterly Report

The Carbon Steel Co., Pittsburgh, has issued a statement of earnings for the quarter ending Dec. 31, as follows:

Balance surplus Oct. 1, 1917.....	\$2,979,563.47
Net profits for quarter ending Dec. 31, 1917	\$874,306.92
Less sundry adjustments.....	2,702.66
Total surplus Dec. 31, 1917.....	\$3,851,167.73
Deduct:	
Cash dividends as follows:	
4% on common stock,	
Paid Dec. 22, 1917...\$120,000.00	
8% on first pref. stock,	
{ 4% payable Mar. 30, 1918.....	
{ 4% payable Sept. 30, 1918.....	40,000.00
6% on 2nd pref. stock,	
Payable July 30, 1918.....	90,000.00
Expenses and attorneys' fees authorized in settlement of litigation.....	64,000.00
Bonus to employees for fiscal year ending Sept. 30, 1917.....	76,491.03
Contributions to Y. M. C. A. and Knights of Columbus War Funds..	4,250.00
Reserved for Federal Income and War Profits Taxes for quarter ending Dec. 31, 1917.....	349,722.77
Depreciation of Plant and Equipment.	188,070.90
	\$932,534.70
Balance surplus Dec. 31, 1917.....	\$2,918,633.03

In his report to the stockholders Charles McKnight, president, says:

While these earnings, in view of all the circumstances, were very satisfactory, the unfavorable operating conditions during the past few weeks, which may continue for some time to come, due to the severe winter weather, freight embargoes and shortage of fuel, indicate the continued curtailment of the production of your company's plant, and stockholders should bear this in mind in anticipation of the statement of earnings for the present quarter, which will be issued during April, 1918.

For the assistance of stockholders in the preparation of their income tax reports for the calendar year 1917, and in reply to several inquiries recently received by your officers, you are hereby advised that the second semi-annual dividend of 4 per cent on the first preferred stock, paid Jan. 5, 1917, and the extra dividend of 2 per cent on the common

stock, paid May 22, 1917, were paid out of earnings accumulated prior to Sept. 30, 1916. All other dividends paid by your company during the calendar year 1917 were paid out of the surplus and net earnings for the fiscal year ending Sept. 30, 1917.

Industrial Finances

The Mechanical Mold & Mfg. Co., Akron, Ohio, has increased its capital from \$10,000 to \$150,000 and intends to make some large additions to its plant.

The Engel Aircraft Co., Niles, Ohio, is offering the unsold portion of \$1,000,000 of its preferred stock at par with one share of common as bonus with each share of preferred purchased. The common stock issue is for \$2,000,000. The company has purchased the plant of the Niles Car & Mfg. Co. and will use that plant for its operations.

The Camden Iron Works, Camden, N. J., has been operated by receivers appointed by the United States District Court for the District of New Jersey since Oct. 22, 1914, with Walter Wood, trading as R. D. Wood & Co., as agent in soliciting orders, purchasing supplies, shipping product and collecting accounts for the receivers. On Feb. 21 the arrangement with Mr. Wood will terminate, and the receivers will thereafter personally conduct all of the operations of the plant under the direction of the United States Court.

The Wharton Steel Co., Wharton, N. J., has filed notice of increase in its capital from \$3,000,000 to \$10,000,000.

Stockholders of the Four Wheel Drive Automobile Co., Clintonville, Wis., which is executing a Government contract involving \$50,000,000 for military trucks, declared a stock dividend of 50 per cent at the annual meeting last week. The capital stock was increased from \$500,000 to \$1,000,000 a year ago and will be increased to \$1,500,000 at once. Officers and directors were re-elected. J. D. Cotton was elected a director to fill the vacancy caused by the death of John Kalmes, treasurer.

Lead Output and Exports in 1917

The production of refined lead, desilverized and soft, from domestic and foreign ores in 1917 is estimated by the United States Geological Survey at 599,000 net tons, compared with 571,134 tons in 1916, and with 550,055 tons in 1915. The figures for 1917 do not include an estimated output of 20,000 tons of antimonial lead, compared with 24,038 tons in 1916 and with 23,224 tons in 1915. The production of desilverized lead of domestic origin, exclusive of desilverized soft lead, is estimated at 297,000 tons, against 316,469 tons in 1916, and 301,564 tons in 1915; and that of desilverized lead of foreign origin at 59,000 tons, compared with 18,906 tons in 1916 and 43,029 tons in 1915. The loss of nearly 20,000 tons in domestic desilverized lead was partly offset by a gain of 7,000 tons in domestic soft lead and much more than made up by a gain of 40,000 tons of desilverized lead of foreign output.

The exports of lead of foreign origin smelted or refined in the United States showed considerable increase. They are estimated at 17,000 tons, against 9,880 tons in 1916 and 38,618 tons in 1915. For the last four years notable quantities of domestic lead have been exported to Europe, and the total for 1917 is estimated at 48,000 tons, compared with 100,565 tons in 1916.

The apparent consumption in 1917 is placed at 527,000 tons against 477,384 tons in 1916.

At a meeting of representatives of engineering organizations in Ohio held in Columbus, Jan. 29, with a view of co-ordinating the various organizations, an association was formed to be known as the Association of Ohio Technical Societies. Clyde T. Morris, professor of civil engineering of the Ohio State University, was elected president, and C. E. Drayer of Cleveland, secretary.

PERSONAL

The recent retirement of Wm. McLauchlan from the firm of Pickands, Mather & Co., Cleveland, marks the end of the business life



WILLIAM McLAUCLAN

of one of the best known men in the iron business in the Central West. During his more than 45 years in the business, he had witnessed a wonderful development. The movement of iron ore from the Lake Superior region for a season increased from 2,000,000 tons to 66,000,000 tons and ore vessels increased in capacity from 300 tons to from 13,000 to 14,000 tons. Mr. McLauchlan devoted his attention very largely to the selling of pig iron. For many years he traveled extensively selling the product of the firm's furnaces. He has taken an

active interest in civic affairs and in numerous charities. He has always been a staunch Republican and enjoyed the friendship of some of the most distinguished leaders of the party. With Mrs. McLauchlan, he is now sojourning at Pinehurst, N. C., where they will remain until early April. Mr. McLauchlan has been succeeded in the firm by his son, Jay C. McLauchlan, who is now stationed at Washington as an assistant to J. Leonard Replogle, Director of Steel Supply for the War Industries Board.

Dr. Arthur M. Hammerschlag, director of the Carnegie Institute of Technology, Pittsburgh, has been made head of the research department of the Quartermaster Corps of the United States Army. He has been granted a leave of absence for the period of the war by the trustees of the institute, and has assumed his new duties at Washington. His place will be filled by A. W. Tardell, registrar of the institute.

W. B. Curtis, formerly in the sales department of the Youngstown Sheet & Tube Co., Youngstown, Ohio, has been promoted from first lieutenant to captain in the Ordnance Department at Washington.

H. S. French, vice-president and general manager of the General Fireproofing Co., Youngstown, Ohio, has also been made a director. For some years he was general manager of the William Tod Co., Youngstown, now owned by the United Engineering & Foundry Co.

Prof. Nicholas Bebelubsky, who will be remembered as prominent in the meeting in New York in September, 1912, of the International Association for Testing Materials, of which he was elected president and over which he was to preside at the succeeding meeting, which would have been held in Russia in 1915 except for the war, was the central figure of a celebration given at the Institute of Engineers of the Ways of Communication of Russia in late October in Petrograd in commemoration of fifty years of services as an engineer and professor.

George Mesta, president Mesta Machine Co., Pittsburgh, fell while coming down the steps of the Ordnance Department Building at Washington on Monday of this week and broke his leg.

Franklin B. Richards, a partner in the firm of M. A. Hanna & Co., Cleveland, is now in the Government service at Washington. He has been detailed to service with the War Department with the commission of captain.

Murray V. Robinson is now connected with the Moller & Schumann Co., Brooklyn, N. Y., covering Long

Island, Connecticut and the Hudson River Valley section of New York State.

C. F. Kettering, vice-president of the Dayton Electrical Laboratories Co., Dayton, Ohio, has been elected president of the Society of Automotive Engineers.

Chester Larner, hydraulic engineer of the Wellman-Seaver-Morgan Co., Cleveland, has resigned to engage in hydraulic engineering construction work in Philadelphia, and has been succeeded by C. M. McCormick.

Thomas S. Watson, president Thomas S. Watson Co., consulting engineer, Majestic Building, Milwaukee, Wis., has been commissioned a major in the Ordnance Officers' Reserve Corps and left Jan. 28 for Washington to assume active duties. Major Watson went to Milwaukee from Spokane in 1900 to become electrical engineer of the Mechanical Appliance Co. Later he engaged in business for himself as a consulting engineer. During the last two years he was associated in a consulting capacity with the Link-Belt Co., Chicago.

Major Frank R. Bacon, president Cutler-Hammer Mfg. Co., Milwaukee, has been transferred from New Haven, Conn., to Washington. Major Bacon was called into active service in the Ordnance Officers' Reserve Corps several months ago to take charge of gun carriage work in the New Haven district.

Elroy C. Robertson has resigned his position as factory manager of the Frantz Premier Co., Cleveland, to become inspector of aeroplanes and aeroplane engineer at large for the Signal Corps. As aeronautical engineer he will have supervision of inspection of aeroplane engines being manufactured in New York, New Jersey and New England, with headquarters at the District Inspection Office of the Signal Corps, 15 Park Row, New York.

G. B. Schneider, superintendent Bickett Machine & Mfg. Co., Cincinnati, has resigned and will establish a machinery sales office in Los Angeles, Cal. He will represent the Haynes Stellite Co., Ready Tool Co., Standard Electric Tool Co., Fulflo Pump Co. and other manufacturers in the Central West and East.

R. S. Cooper, vice-president of the Independent Pneumatic Tool Co., Chicago, has assumed the duties of general sales manager of the company, in addition to those of vice-president. He was for many years the manager of the company's eastern branch in New York. R. T. Scott, formerly manager of the Pittsburgh branch, has been promoted to the office of eastern manager and H. F. Finney, who traveled the Chicago and St. Louis territories, has been made manager of the Pittsburgh office.

Charles E. Ash, superintendent of the blast furnaces of the McKinney Steel Co., Cleveland, has resigned and has been succeeded by George O. Hollenbaugh, formerly assistant superintendent.

A. H. Preston, formerly general storekeeper of the Upson Nut Co., Cleveland, became purchasing agent of that company Feb. 1, succeeding C. E. Hill, who was transferred to the treasurer's department.

The Rensselaer Valve Co., Troy, N. Y., announces the following appointments in its sales organization, effective Feb. 1, 1918: Charles L. Brown, sales manager New England branch; A. E. Jones, sales manager Chicago branch; George M. Keefer, sales manager Pittsburgh branch; John S. Warde, Jr., sales manager New York branch.

Richard K. Papin, formerly St. Louis and Southwestern representative for the Davenport Locomotive Works and for 10 years manager of the equipment department of the Walter A. Zelnicker Supply Co., St. Louis, has been appointed by the latter company as manager of the branch office just opened in the Plymouth Building, Minneapolis, Minn., which will serve the North Central and Canadian trade.

Thomas B. Davies has been appointed district sales representative of the Central Steel Co., Massillon, Ohio, with headquarters in the University Building, Syracuse, N. Y.

H. D. Gates has returned to the Pangborn Corpora-

tion as sales manager, the post from which he resigned four years ago to take charge of the Mott Sand-Blast Co. F. J. Hull, who served the Pangborn Corporation as engineer, five years ago, and more recently has been in the employ of the Mott Sand-Blast Co., has likewise returned to the Pangborn Corporation in the capacity of assistant engineer. Charles T. Bird, who over the past year has been identified with the production and engineering departments of the Pangborn Corporation, has been transferred to the sales department, and assigned to what is called the home territory with headquarters at Hagerstown, Md.

D. A. Stuart has been appointed Pittsburgh representative in charge of sales of the Sizer Forge Co., Buffalo, and has opened offices in room 908, First National Bank Building, Pittsburgh.

W. P. Snyder, president Shenango Furnace Co., Pittsburgh, has gone to Florida for the remainder of the winter.

George M. Demorest, Pittsburgh, has removed his office from the Dollar Savings and Trust Building to the Union Arcade Building.

Henry R. Moore, traffic manager of the Republic Iron & Steel Co., Youngstown, Ohio, has been named the representative from that city of the American Iron and Steel Institute's sub-committee on traffic and transportation, which will have charge of making daily reports to Director-General McAdoo on carrier conditions.

J. M. Homs, manager of foreign sales, Four Wheel Drive Automobile Co., Clintonville, Wis., has resigned in order to engage in the exporting business with his brother, with headquarters in New York. C. S. Thompson, Chicago, has been appointed to succeed Mr. Homs.

Jonathan Warner, president of the Trumbull Steel Co., Warren, Ohio, is being prominently mentioned as a possible candidate for Congress to represent the nineteenth Ohio district. This district is composed of Mahoning, Trumbull and Ashtabula counties in Ohio, and is said to be the second largest steel district in the country.

Eli Joseph, president of Joseph Joseph & Brothers Co., New York, has gone to Palm Beach, Fla., for a month's sojourn.

Robert P. Lamont, president American Steel Foundries, Chicago, has been commissioned a lieutenant-colonel in the reorganized Ordnance Department of the United States Army. He will act as assistant chief in the procurement division, in charge of the purchase of shells and ammunition. Lieutenant-Colonel Lamont is already stationed at Washington, D. C.

Carl G. Barth, consulting management engineer, Philadelphia, is to address the Philadelphia section of the American Society of Mechanical Engineers on Feb. 26 on "The Income Tax."

L. H. Thullen, formerly with the Hall Switch & Signal Co., New York, has been made general manager of the Grand Rapids Brass Co., Grand Rapids, Mich.

Carl T. Hewitt, formerly with the Remington Arms Union Metallic Cartridge Co., Inc., Bridgeport, Conn., is now metallurgist and testing engineer for the Fafnir Bearing Co., New Britain, Conn.

E. P. Worden has resigned as chief engineer for Henry R. Worthington to become mechanical engineer for the Submarine Boat Corporation, New York.

Alfred L. Aicher, recently chief draftsman of the F. J. Stokes Machine Co., Philadelphia, is now with the Southwark Foundry & Machine Co., Philadelphia.

Edwin A. Moore, of the Union Switch & Signal Co., Swissvale, Pa., has been made manager of the Liberty Ordnance Co., Bridgeport, Conn.

W. H. Vosmer has been made general manager of sales of the Donner Steel Co., Buffalo, and he is succeeded as office manager in New York of the Midvale Steel & Ordnance Co., 165 Broadway, by William S. Sanders, who has been long identified with the New York office of the Cambria Steel Co., remaining with the Midvale Steel & Ordnance Co. when the latter ac-

quired control of the Cambria company. Mr. Vosmer has also been identified for years with the Cambria company, having represented it in Cincinnati, and he became attached with the American Steel Export Co. when that organization was established as an affiliated company with the Cambria Steel Co. On the acquisition of the Cambria company by the Midvale interests, Mr. Vosmer joined the New York office.

Cameron C. Smith, chairman of the Union Steel Casting Co., Pittsburgh, recently appointed major, Ordnance Reserve Corps, and assigned to the Production Department, United States Army, with headquarters in Washington, was born in Clinton township, Butler County, Pa., April 2, 1861.



CAMERON C. SMITH.

His first business connection was as stenographer with Wilson, Walker & Co., Ltd., at that time operating the Lower Union Mills in Pittsburgh, and making iron and steel bars, plates, and other products. He was with this concern for 10 years, during which time it was merged into Carnegie, Phipps & Co., Ltd., and later was taken over by the Carnegie Steel Co., by which it is still operated. In 1893 he left the employ of the Carnegie Steel Co. and went with the Reliance Steel Casting Co., being with that concern for six years. In 1899 he left the Reliance Steel Casting Co. and organized the Union Steel Casting Co. of Pittsburgh. He was secretary and general manager of the company during the first year, and in 1900 was elected president, holding that position until Jan. 26, last, when he was made chairman of the board.

Coke Production Falls to the Lowest

A report of the United States Geological Survey on the production of bituminous coal issued Feb. 2 states that, although during the week of Jan. 26 a recovery from the depression of the previous week was noted, production was still far short of normal. The weather was cold, but the snow falling over most of the fields was not heavy enough further to impede transportation. The total bituminous production, including lignite and coal made into coke, was 10,018,000 net tons, or 1,670,000 tons per working day, the rate approximating that of a fortnight ago, during the first week of the depression, when the daily average was 1,689,000 tons.

The production of beehive coke did not share in the recovery made by the bituminous industry as a whole. The total production of the week ended Jan. 26 is estimated at 491,000 net tons, an average per working day of 82,000 tons, the lowest recorded since the Survey's bulletins were begun. Fifty-seven of the principal operators in the beehive coke district of Connellsville, Greensburg and Latrobe reported a production of 202,650 net tons of coke, or 48.7 per cent of their capacity as rated by the railroads. The normal performance of the same operators during recent months has been about 65 per cent of the rated capacity. The extraordinary depression is attributed to shortage of coke cars.

The total production of by-product coke dropped from 361,451 net tons to 319,524 net tons in the week ended Jan. 19, the by-product coke statistics being one week behind beehive coke figures. Fifty-one out of the fifty-three by-product plants now in operation produced in all 65.9 per cent of their capacity.

A symposium on non-essential industries is to be given by the New York section of the American Society of Mechanical Engineers at the Engineering Societies Building on the evening of Feb. 21.

OBITUARY

THOS. FAWCUS, president of the Fawcus Machine Co., Pittsburgh, whose death Jan. 22 has been noted in THE



THOMAS FAWCUS

IRON AGE, organized the Fawcus Machine Co. in 1900 for the manufacture of gears and special machinery. The company started business in a one-story building at 2820 Smallman Street. This was later increased by the addition of a second-story. In 1906 the building at 2828 Smallman Street was added. The growth of the business was so rapid that in 1910 the plant at Ford City was purchased. Mr. Fawcus was endowed with the rare combination of superior executive ability and a keen inventive brain. This is attested to by the growth of the company and his many

mechanical inventions, the most notable of which are the machines for cutting herringbone gears. In 1912 Mr. Fawcus started to design and develop the Fawcus herringbone gear cutting machines, which were later covered by patents both in the United States and foreign countries.

FRED H. FORMAN, some years ago general manager of sales of the Pittsburgh Steel Co., Pittsburgh, died of pneumonia at his home in South Pasadena, Cal., Thursday night Jan. 31, after an illness of only a few days. Mr. Forman spent practically his entire business life in the wire trade, and had a wide acquaintance in the trade all over the country. His first business connection was with the St. Louis Wire Co., as treasurer. Associated with the company at the same time were John W. Gates, Wm. Edenborn and others equally well known. When the Consolidated Steel & Wire Co. was formed, Mr. Forman went with it, having charge of sales of its Louisville office. The company maintained large warehouses in Louisville. In 1901, the Pittsburgh Steel Co. was organized in Pittsburgh by Wallace H. Rowe and others, and Mr. Forman became general sales manager, filling the position until 1913, when he retired on account of ill health, and went to California in the hope of recuperating. His health improved to some extent, and he returned to Pittsburgh, again being connected with the sales department of the Pittsburgh Steel Co. for several years. However, his recovery in health was not permanent, and he again returned to California to live.

ABRAM P. MORRIS, president of the Morris Machinery Co., Newark, N. J., died Feb. 3, from pneumonia. Mr. Morris was born in Norristown, Pa., 54 years ago. For many years, he was a successful dealer in second hand machinery.

A reduction in the number of sizes of structural shapes in Great Britain has been effected. The list has been adopted after a conference between the Admiralty and the Ministry of Munitions as sufficing to cover all practical requirements in ship, bridge and building constructions for the duration of the war.

Each of the 14,000 or more employees of the Youngstown Sheet & Tube Co., Youngstown, Ohio, has been presented a safety calendar, each month of which has a striking cartoon emphasizing some feature of safety first. The cartoons were prepared under the direction of the National Safety Council.

FREQUENCY OF ACCIDENTS

Green Men Suffer to Greater Extent Than the Experienced

WASHINGTON, Feb. 5—Recent investigations by the Bureau of Labor Statistics of the Department of Labor have demonstrated that the question as to whether the "green" man in industry is more subject to accident than the experienced man is one of particular interest at the present time when great industrial activity has resulted in so many new men being taken on by manufacturing concerns, notably in the iron and steel industry. The question is also one of very great practical importance since, if it is true that the "green" man is peculiarly liable to accident, efforts toward accident prevention must take this factor into account.

The limited data so far available have been carefully reviewed by the bureau's experts and indicate that the inexperienced worker does have a very high accident rate and that the rate tends to decrease with his degree of experience. But the available information is so limited as to warrant the separate publication of certain statistics gathered as a contribution to the subject. These figures obtained in connection with a study on accidents in the iron and steel industry show the accident frequency per 1000 300-day workers classified according to their amount of experience. The data set forth in the table presented below are for a group of 3527 300-day workers in a large steel plant during a period of five months.

Accident Frequency Rates According to Length of Service			
	Number of 300-day workers	Number of accidents	Accident frequency rates
Six months and under.....	512	57	111.3
Over six months to one year..	278	29	104.3
Over one year to three years..	357	31	86.8
Over three years to five years.	637	27	42.4
Over five to 10 years.....	814	16	19.7
Over 10 to 15 years.....	470	4	8.5
Over 15 years	459	0	....
Total	3,527	164	46.5

The striking feature of the above table is the steady and marked decline in the accident rate with increasing experience. It is altogether probable that even more striking results would appear if the first year could be more finely subdivided.

The table has one feature which should render its testimony of greater weight than that of most compilations on this subject. Ordinarily the only available information is the number of accidents to men of a given degree of experience. The fact that there were, in a given period, 10 accidents to men of less than six months' employment, while to those employed six months to one year there were five, suggests that there was a greater hazard to those of shorter experience. It does not prove the point, however, as in order to do that it is necessary to know how much labor was performed by men of each degree of experience; in other words, to know the number of 300-day workers. In the preparation of the above table, this information was available with sufficient accuracy to give entirely reliable results for purposes of comparison.

Finally, it is to be noted that other factors besides inexperience may account in part for the showing made in the above rates. For example, workers of more than 15 years' service are to a considerable extent, for one reason and another, those who have passed out of the extreme danger zones. Their immunity is probably due much more to that fact than to the degree of their experience. But, after all necessary qualifications, it would appear that beyond question this table does establish a strong probability that the inexperienced man has high hazard on account of his inexperience. In such case it becomes little less than criminal that he should be thrust, as has been too often the custom, into those occupations in their nature extra dangerous.

The Lavino Furnace Co., which was recently incorporated in Delaware, with capital stock of \$5,000,000, takes over all of the furnace properties of E. J. Lavino & Co., Bullitt Building, Philadelphia.

Germany's Desires for Foreign Ores

Germany's desire to insure a continued flow of iron ore from lands not included in German territory before the war was shown in a recent meeting of the Stahlwerksverband, according to comments on the subject by *Engineering* of London. One speaker had the following to say, in substance:

Before the war 50 per cent of the ore necessary for Germany's production of 16,800,000 tons of pig iron had to be imported. In the course of 40 or 50 years Germany's iron ore deposits would be about exhausted. France could perfectly well give up to Germany the necessary quantities of iron ore, without doing her own industry any harm. Russia was in a similar position. In the Krivoi-Rog basin in the Ukraine, there were enormous deposits of the most ideal ore for Bessemer pig iron, which were of the greatest importance both for the Upper Silesian and the West German iron industry. The Polish deposits could supply some 100,000 tons of iron ore annually to the Upper Silesian iron works, and the Swedish iron ore from the vast deposits in Lapland would also be of importance in the future. In addition it would be necessary for German iron works to secure their share of the extensive and valuable ore deposits in Brazil. As regards manganese ore the immense deposits in the Caucasus and other parts of Russia stood at the head of the list, and it must be remembered that for this essential commodity Germany was entirely dependent upon imports from abroad. The safe supply of iron and manganese ore must be kept in the foreground at the peace negotiations, for on this hung the continued existence of German industry, the German State and the German people.

Our British contemporary expresses no surprise that in view of the German designs on her ore France has fought so splendidly at Verdun, which is close to the coveted area. In our own columns in 1915, H. H. Campbell explained the great economic importance of the Verdun campaign.

Pneumatic Drilling Machine for Light Service

For reaming and drilling holes which do not exceed 5/16 and 9/16 in. in diameter respectively the Ingersoll-Rand Co., 11 Broadway, New York, has developed a new lightweight pneumatic drilling machine. It is of the non-reversing type and was especially designed for drilling automobile frames and kindred work. The motor is of the four-piston type and by removing five cap screws it is possible to withdraw the crankshaft assembly in one piece. A gear-driven rotary valve is used and ball and roller bearings are employed throughout. The over-all length of the drill when equipped with a chuck is 14 3/4 in. and the distance from the side of the drill to the spindle center is only 1 1/2 in., which, it is pointed out, will be found an advantage where it has to be used in awkward places. Either a breast spade handle or a telescopic feed screw which provides for a feed 2 1/2 in. in length can be furnished. The spindle speed is 1000 r.p.m. and the weight is 15 lb.

Ferromanganese Imports for December and for 1917

Imports of ferromanganese in December, 1917, were 2959 gross tons. They were received as follows: Through the port of New York, 944 tons; Baltimore, 865 tons; Philadelphia, 630 tons and New Orleans 520 tons. This brings the total for 1917 to 45,381 tons as compared with 77,836 tons in 1916, 55,201 tons in 1915 and 128,070 tons in 1913.

The estimated cost of building operations in Cincinnati for January, this year, is \$781,895, against \$609,105 for January, 1917. The large increase this year is stated by the city building commissioner to be due to a permit issued for a theater and office building, although a number of permits were issued for additions to manufacturing plants, during the month just passed.

Accuracy versus Precision

That the confusing of the two factors of accuracy and precision has been the cause of many difficulties and misunderstandings in the past three years in the manufacture of munitions is the contention of Capt. Earle Buckingham, Ordnance Department, U. S. R. and G. F. Matteson, Watertown Arsenal, in a joint communication to the American Society of Mechanical Engineers. A company, for example, would take a contract to manufacture certain articles to specified limits of accuracy. This company had manufactured its own product to similar limits of precision, or assumed that it had, and foresaw but little difficulty in meeting the requirements. But when the actual production started, and the company was required to maintain the specified degree of accuracy, it discovered that there were much more severe conditions to be met than it had ever contended with before.

"The establishment of manufacturing tolerances," the letter continues, "is too often based upon assumptions rather than definite records of past performances. For example, some time ago I personally made some tests at a plant covering a period of a couple of months, to determine, among other things, what their normal variation in milling cuts amounted to. This company was an old established concern, produced work of the highest quality, and had a very complete inspection system. The use of limit gages, however, was not general. In many cases only a go gage was provided, and all work was required to fit this gage. This company assumed that all work which passed this inspection did not have a total variation of over 0.001 in. They were so certain of the fact that they would not have hesitated to give sworn evidence that they could hold their milling cuts within a limit of 0.001 in. But the tabulation of several hundred measurements of the same dimension on similar pieces revealed the fact that their normal variation in milling cuts amounted to over 0.005 in. instead of only 0.001 in. Similar conditions exist in many other plants.

"Another striking example in this connection is in regard to threading tools and gages. The producers of these articles will only guarantee their product to a limit of error which seems excessive in comparison with their specifications of a few years ago. As a matter of fact, these tools are practically the same as those made in the past, but the facilities for checking them have been so improved that discrepancies are now discovered which in the past had been assumed to be very much smaller. These examples could be multiplied almost indefinitely."

Mechanical Engineers' Spring Meeting

Utilization of non-essential industries, the shipbuilding industry of New England, the manufacture of small arms and the manufacture of gun carriages are numbered among the topics to be taken up at the spring meeting of the American Society of American Engineers to be held at Worcester June 4-7. Two or more sessions are also scheduled to the subject of how the engineering societies can assist the procurement program of the Government including: Ordnance for the army and navy; aircraft procurement; cargo vessels and ships; mobilizing and training of labor; quartermaster supplies. The relationship of towns and cities to the problems of war is also announced as a part of the program.

Favor American Electrical Goods

America's opportunity of increasing its sales of electrical goods in Ecuador and Peru during the absence of German competition is pointed out in a report made public by the Bureau of Foreign and Domestic Commerce of the Department of Commerce. Before the war this trade was divided between Germany and the United States, the advantage being with the American manufacturer. The Government's report is concerned with the market as it exists to-day and the opportunities it offers for the future.

INDUSTRIAL HOUSING

Adequate Facilities with Cost Determined by Rent-Paying Power

ADEQUATE housing facilities and the elimination of congestion and unsanitary conditions are prerequisites to stable, efficient and satisfied labor in industrial communities, according to H. W. Forster, whose address delivered before the Philadelphia Safety Council at the Engineers' Club in Philadelphia, Nov. 30, is reviewed below.

Industrial housing must provide for families living by themselves, families who take boarders and boarding houses. A recent compilation of data made by the United States Government, covering some 200 industrial housing projects comprising 17,643 houses, showed that one-third of these were four-room size, one-sixth were five-room size and one-sixth were six-room size. The average family generally consists of father, mother and three children, and properly to house such a family there should be available three bedrooms, a combined kitchen, dining room and living room, or two rooms, one for kitchen and dining room purposes, and the other for living purposes. In other words, four and five-room houses are theoretically correct, especially for foreign families, and experience will bear out that these are the most popular sizes. For larger families, and particularly those who desire to keep a few boarders, six-room houses have proved popular among foreigners. The average American family unquestionably prefers about a six-room house. The United States Government report, presented by Mr. Magnussen at the National Housing Association conference in Chicago, October, 1917, and referred to above, stated that information regarding 53,175 houses indicated that of these 48 per cent were single houses, 35 per cent double houses, 11 per cent row houses, and that on 6 per cent no information was obtained. There is little doubt that the single house is the ideal one and that this is the best house to build for selling purposes.

To be successful industrial housing must be upon the same economic basis as any other form of industrial operation. Yet we find six-room houses where four and five-room houses would answer, and excellent roads and cement sidewalks when it would be entirely feasible to keep such improvements for some time in the future. Furnace or other central heat is particularly expensive under present conditions, and in many houses superfluous. A sewer system is not so important and, where developments are in outlying sections, it is entirely feasible to delay its installation. A great number of foreigners do not object if bathroom equipment is not provided and when the women are accustomed to cooking on a coal stove provision for gas is not necessary.

Rent-Paying Power and House Cost

Recent careful investigations and calculations of the minimum cost of food necessary properly to feed an average family are as follows:

Father, 150-lb. laborer.....	3,000 calories
Mother, 150-lb. woman working hard.....	3,000 calories
12- to 15-yr. old boy.....	4,500 calories
Child, about 3 yr. old.....	1,300 calories
Child about 6 to 8 yr. old.....	2,500 calories

Total.....14,300 calories

These figures are generous for growing children, but only moderately so for the parents. Assuming intelligent purchasing of food, the minimum cost of 1000 calories to-day will be about 11 cents, and for 14,300 calories about \$1.57 per day, or something like \$47 per month. The problem, then, is to subtract from the man's income the necessary food expenditures, and then take a percentage of the balance as being available for rent. This percentage has been placed at a maximum of 40, especially with low-wage workers. The man earning \$90 per month, spending \$47 for food, has \$43 left for all other expenses. If he pays 40 per cent of this for rent, he has approximately \$17 as a maximum rent item. Many workmen, particularly skilled Americans, can and do pay considerably higher

rents, but there are large numbers whose rent-paying capacity ranges from \$10 to \$15 per month.

If houses are to be rented upon a 10 per cent gross return basis, which is an average figure, the total cost of the house to the man who can pay \$17 per month rent should not exceed \$2,000, and to the man whose rent is to be \$10 per month not more than \$1,200. Where houses are built of reinforced concrete, it probably is good business to rent them for 9 per cent or even 8 per cent of their value, because of relatively low depreciation and upkeep. With frame houses 10 per cent is the absolute minimum that is advisable, made up as follows: Return on investment, 5 per cent; taxes, 1 per cent; depreciation, 2 per cent, and upkeep, 2 per cent. These figures for depreciation and upkeep are probably liberal, but form a margin of safety, partly to take care of vacancies. The consensus of opinion of those who have studied the industrial housing problem is very decidedly against anything savoring of charity or paternalism.

Association of Iron and Steel Electrical Engineers

The Association of Iron and Steel Electrical Engineers has announced the chairmen of various committees as follows:

W. T. Snyder, National Tube Co., McKeesport, Pa., chairman of standardization committee; W. O. Oschman, Oliver Iron & Steel Co., Pittsburgh, chairman power committee; A. H. Swartz, Westinghouse Electric & Mfg. Co., Pittsburgh, chairman publicity and promotion committee; K. H. Cederland, Duquesne Steel Works, Carnegie Steel Co., Duquesne, Pa., chairman electric furnace committee; J. F. Kelly, National Tube Co., McKeesport, chairman membership committee; Walter Greenwood, Carnegie Steel Co., Ohio Works, Youngstown, Ohio, chairman safety committee; B. W. Gilson, Carnegie Steel Co., Ohio Works, Youngstown, educational committee; E. Friedlander, Carnegie Steel Co., Edgar Thomson Works, Braddock, Pa., chairman editing committee; A. H. Swartz, Westinghouse Electric & Mfg. Co., chairman convention committee; W. C. Kennedy, Standard Seamless Tube Co., Ambridge, Pa., chairman electrical development committee; F. D. Egan, Pittsburgh Iron & Steel Foundries Co., Midland, Pa., chairman finance committee.

The next annual convention of the association will be held Sept. 9-13 in New York or Baltimore. A meeting of the Pittsburgh section is scheduled for Feb. 16 at the Hotel Chatham, at which D. L. Lindquist, chief engineer Otis Elevator Co., will present a paper on "A-C and D-C Skip Hoists."

The officers, the majority of whom were elected at the annual meeting in Philadelphia, are as follows:

President, C. A. Menk, Carnegie Steel Co., Munhall, Pa.; first vice-president, D. M. Petty, Bethlehem Steel Co., South Bethlehem, Pa.; second vice-president, B. W. Gilson, Carnegie Steel Co., Youngstown; secretary, J. F. Kelly, National Tube Co., McKeesport, and treasurer, James Farrington, La Belle Iron Works, Steubenville, Ohio. The other directing officers are Past President F. D. Egan, Pittsburgh Iron & Steel Foundries Co., and W. T. Snyder, National Tube Co., McKeesport, Pa.

The Mercury Steel Products Co., Inc., has established itself in business at 256 Broadway, New York. G. Fialla and Max Eppler of the firm of Fialla & Eppler are president and secretary of the company. The firm of Fialla & Eppler, which is directly allied with the Mercury company, has been established in manufacturing and exporting for fifteen years. Maurice Hamburger is treasurer, and Max Hamburger, who has been identified with exporting for the last two years, in iron, steel and metal products, is general manager.

The American business of The Sociedad Anonima Bos, importers and exporters of metals, steel and machinery, Barcelona, Spain, has been incorporated as the Bos General Corporation of America, with headquarters in this country at 90 West Street, New York.

NEW SCRAP COMMITTEE

Important Consuming Interests Represented—
W. Vernon Phillips, Chairman

As a result of the recent meeting of buyers and sellers of scrap, held at the office of E. A. S. Clarke, president Lackawanna Steel Co. and secretary of the Committee on Steel and Steel Products of the American Iron and Steel Institute, a new committee on iron and steel scrap has been appointed to deal with all matters relating to prices and other subjects connected with the old material market. The old committee, which was composed entirely of men engaged in the scrap business, resigned and is succeeded by a committee representing various important interests. W. Vernon Phillips has been selected as chairman and has resigned from the secretaryship of the Perry, Buxton, Doane Co., Philadelphia, in order that he may be able to give his full time and unbiased attention to his new duties. The other members of the committee are:

Sellers of scrap—Charles Dreifus, Charles Dreifus & Co., Pittsburgh; Joseph Michaels, Hyman, Michaels Co., Chicago; Eli Joseph, Joseph Joseph & Brothers Co., New York; C. A. Barnes, chief of the Bureau of Inspection and also secretary of the American Board of Scrap Dealers, Philadelphia.

Manufacturers of open-hearth steel—H. B. Spackman, Lukens Steel Co., Coatesville, Pa.; W. N. Tobias, Bethlehem Steel Co., Bethlehem, Pa.; Charles E. McKillips, Carnegie Steel Co.

Manufacturers of bar iron—John C. Brown, Lebanon Valley Iron & Steel Co., Lebanon, Pa.; Walter C. Ely, Highland Iron & Steel Co., Terre Haute, Ind.

Rerolling mills—D. C. Schonthal, West Virginia Rail Co., Huntington, W. Va.; Arthur S. Hook, Calumet Steel Co., Chicago.

Steel casting and electric furnace interests—Thomas E. Moritz, American Steel Foundries, Chicago; Rodney Thayer, Penn Marine & Ordnance Castings Co., Inc., New Castle, Del.

Manufacturers of crucible steel—J. S. Pendleton, Carpenter Steel Co., Reading, Pa.

Manufacturers of gray iron and malleable castings—Benjamin D. Fuller, Westinghouse Electric & Mfg. Co., Cleveland.

Test of Boiler Fired with Pulverized Coal

A combined boiler and furnace efficiency of 72.5 per cent was secured in a 24-hr. test made at the demonstrating plant of the Powdered Coal Engineering & Equipment Co., Chicago. The boiler was a 150-hp. Brownell horizontal return tubular unit and the fuel used was La Salle County, Ill., screenings having a heating value of 10,158 B.t.u., more than 90 per cent of which passed through a 200-mesh screen. The fuel was fed by two 12-in. Pruden coal carbureters and the total amount of coal fired was 17,635 lb. or 17,107 lb. on a dry basis. The test was run for 23¼ hr., with an average outside temperature of 0 deg. Fahr. The total equivalent evaporation from and at 212 deg. was 129,554 lb. or 5572 lb. per hr. or 72.59 lb. per lb. of dry coal. The powdered coal was lighted under a cold boiler 3 hr. before the test was started, the average temperature of the air fed with the powdered coal being approximately 4 deg. and at the end of the test within a few minutes after the flame had been turned off under the boiler the temperature of the furnace was approximately 2300 deg. Fah. It is claimed that a saving of 3.74 per cent of the heating value of the coal was effected solely because the coal was completely burned.

The War Trade Board, which established New York headquarters some months ago in the building formerly occupied by the Hamburg American Line at 45 Broadway, has decided to occupy the entire building. It accordingly gave notice on Feb. 2 to numerous occupants on the nine floors that their rooms will be needed by March 1.

SHUT-DOWNS TO CONTINUE

To Heatless Mondays Other Idle Periods May
Even Be Added

WASHINGTON, Feb. 6.—(By Wire).—The heatless Monday order will be continued indefinitely and may be supplemented by two more four-day shutdowns of all industry. This decision, reached last night at a conference between Fuel Administrator Garfield, Director-General of Railroads McAdoo and a dozen State fuel administrators, was semi-officially announced this morning and will probably be followed by a formal statement later in the day. The decision has caused much disappointment here, as the statement given out by Dr. Garfield and Mr. McAdoo on Feb. 1 that the suspension of the Monday closing order was under consideration was accepted as foreshadowing the abandonment of this policy.

There had been every indication up to last night that the Monday holidays were over, but reports brought to Washington by the State fuel administrators that throughout most of the East there is on hand but one day's supply of coal, coupled with the weather situation, upset all calculations. Even Mr. McAdoo, who, it has been asserted, was opposed to the closing plan, was said last night to have agreed that until the weather permits an improvement in railroad operations the order should be continued in force.

The blizzard has cut coal production and movement to such an extent that officials pointed out last night that even had the Monday closings been abandoned, industry would be forced to close down to a considerable extent because of a lack of fuel. Reports to the Fuel Administration last night were said to show that in many States plants already are closing in large numbers. There are indications that if better weather does not come to improve the situation officials will take up for consideration an amendment to the closing order prescribing two four-day shutdowns, one covering the period of Lincoln's birthday anniversary and the other Washington's birthday. Lincoln's birthday, Feb. 12, falls on Tuesday, bringing a three-day holiday over Sunday, Monday and Tuesday. If Saturday, usually observed as a half holiday, were made a complete holiday, this would give a four-day closing. Washington's birthday, Feb. 22, on Friday, offers another opportunity to make Saturday a complete holiday and thus give another four-day closing period.

While the results secured from the first four-day shutdown were not at all commensurate with the accompanying disturbance of industry, it is nevertheless possible that the Fuel Administration may decide to make further experiments in the same direction.

Graphite Output in 1917

The production of crystalline graphite in the United States was increased last year about 24 per cent, amounting to approximately 6800 tons, against 5466 tons in 1916. About 60 per cent of the output in 1917 was flake graphite suitable for making crucibles; the remainder was dust graphite. These figures are made public by the U. S. Geological Survey, as a preliminary estimate based on the work of H. G. Ferguson of the Survey and others.

The imports of crystalline graphite in 1917, as shown by the records of the Bureau of Foreign and Domestic Commerce for the first 10 months and as estimated for November and December, amounted to more than 32,000 tons, of which 25,000 tons came from Ceylon. If the Alabama producers could have had free access to the markets a much larger proportion of our needs could have been supplied from domestic sources.

The value of the graphite produced in 1917 is considerably greater than that produced in 1916, for No. 1 flake has commanded a higher price and many of the mills marketed a larger proportion of this grade in 1917 than formerly.

Figures showing the production of amorphous graphite are not yet available.

South Africa's First Electric Steel Furnace Is Unique

The first electric steel furnace in South Africa has recently been put in operation and it possesses some interesting features, particularly the use of Monel metal in its construction. The following account was given before the South African Institute of Electrical Engineers recently by Professors W. Buchanan and G. H. Stanley:

The scheme originated in a desire to take up locally the manufacture of the battery stamps and shoes required in gold milling. A committee appointed early in 1916 reported that such manufacture was possible by the use of existing accumulations of scrap shoes and dies, and that an electric furnace of the induction type appeared to meet the requirements most nearly. A site and building were secured on the property of the Robinson Gold Mining Co. and work started in May, 1917. Vexatious delays occurred through shortage of men and materials, but nevertheless current was switched on to the furnace on Sept. 3, nothing but locally available materials having been used.

The body of the furnace was built up of special radial and rebated lumps made at Vereeniging, tied over all with steel hoops terminating in screwed ends passing through yokes, so that tightening or loosening could be effected. Any further iron or steel work being very undesirable from the electro-magnetic point of view, the plates between these and the brickwork were of Monel metal—another feature believed to be novel—in fact this alloy was used, replacing iron or steel, wherever desirable and possible in this furnace. To keep the power factor as high as possible, the interior wall was made 8 in. thick (*plus*, of course, the thickness of the lining), while the outer brickwork has a thickness of 9 in., in each case laid in fireclay. The cover bricks are of radial shape, 2 in. thick, and to prevent breaking or cracking are clamped by means of Monel metal rods flattened and bent over at the ends, and with screws put through so that they may be tightened up. A strip between them serves for lifting when required.

In the annular trough formed between the inner and outer walls the working lining of the hearth is placed, and one of the initial difficulties was the selection of a suitable material for this lining. Knowing that reasonably pure magnesite occurred in the country, it was originally intended to construct the lining of calcined magnesite, but owing to the difficulty of satisfactorily calcining this material the first lining was made by ramming ganister, prepared by grinding together pure quartz with a small amount of fireclay, round a sectional wooden template, moved from place to place round the furnace till the lining was complete. Distance was kept with regard to the center by means of a radius rod.

At first the quality of the product was very irregular, a large proportion being honeycombed with blowholes and the carbon content varying very widely in different cases; but with increasing experience more uniform product is being turned out.

At the annual meeting of the Buckeye Land Co., a subsidiary of the Youngstown Sheet & Tube Co., held in Youngstown, Ohio, recently, plans were made for the work to be done this year. The Buckeye Land Co. is handling the housing developments of the Youngstown Sheet & Tube Co. and at present is building 100 houses on the Loveland Hill tract, group houses at East Youngstown on the unit plan, and settlement houses for its miners in Greene County, Pa. Officers of the company were elected as follows: President, James A. Campbell; vice-president, C. S. Robinson; secretary, Leroy Manchester; assistant secretary, Walter Neub; treasurer, Richard Garlick; assistant treasurer, W. J. Morris, and manager, Paul Kuegle. Roy Welch, who recently assumed charge of the industrial relations work, was elected to the board of directors, succeeding Dudley R. Kennedy.

Making Steel With Two Converters and an Electric Furnace

An English inventor offers an interesting process, using two converters and an electric furnace for making steel from low-grade pig iron, the composition of which may vary widely—high in silicon and phosphorus and with a sulphur content of 0.2 per cent or less. The object of the inventor, Arthur Rollason, a metallurgist of Nottingham, is the production of an iron suitable for the manufacture of the highest grade of steel.

It is proposed to carry out the refining in separate stages and in such a manner as to remove a large portion of the impurities from the metal before it reaches the final refining stage, thus reducing the work in the electric furnace and carrying out the operations under complete control and much more rapidly and effectively, with less wear and tear on the furnaces and at a reduced cost. The first stage consists of the desiliconization and decarbonization of the metal, for which purpose sufficient molten metal from the blast furnace or cupola is teemed into an ordinary acid-lined converter (preferably of the side-blown type) with surface oxidation, and is blown in a manner similar to that used in the Tropenas process.

In the second stage the dephosphorization and desulphurization take place, for which purpose the molten metal is transferred from the first converter to a second converter of the side-blown type with surface oxidation, but constructed with an extra set of tuyeres. This second converter is lined with a basic material, and with the addition of the necessary lime is blown as a basic blow. If the phosphorus content of the metal is low, it is proposed to blow air and gas through the extra tuyeres and through or over the metal to raise its temperature. If overblown, it is proposed to blow air through the tuyeres over the metal to lower its temperature.

The third stage consists in the deoxidation and complete refining. The molten metal from the second converter is then transferred to an electric furnace heated ready for the charge. To prevent oxidation, the highly silicious slag from the acid-lined converter, together with any other necessary material, is added to the furnace either before or after the transfer of the metal. A low-voltage alternating current is used to keep the metal hot and in circulation, which action brings into intimate contact the whole of the molten metal with the elements and slag added, and it is claimed that complete deoxidation and the elimination of the remaining impurities in the metal are effected.

Large Orders for Locomotives

Orders for locomotives in recent weeks, principally in January, have amounted to about 250. The American Locomotive Co. will build 25 locomotives for the Chesapeake & Ohio; 20 Mallet locomotives for the Hocking Valley; 13 locomotives for the Miami Conservancy District; 10 locomotives for the Maine Central; 29 locomotives for the Illinois Central; 20 freight locomotives for the Missouri, Kansas & Texas; 20 consolidated locomotives for the Delaware & Hudson; 15 Mikado and 5 Pacific locomotives for the Minneapolis & St. Louis and 4 switching locomotives for the Long Island. An order for 40 locomotives for the Norfolk & Western has been divided equally between the American Locomotive Co. and the Baldwin Locomotive Works. About 55 locomotives are still upon the market.

Representatives of British labor are making visits to the front in France every week day. Two parties each consisting of about 25 each are taken to various places of interest in the British zone. Rest houses have been arranged at suitable points and the parties spend the evenings in these. The scheme allows for some 300 British workers visiting the front each week and they are thus able from first hand information to tell their fellows at home of the conditions in France.

Defeat of War Cabinet Bill Predicted

Bill for Director of Munitions Will Probably Meet Same Fate—Howard E. Coffin Advocates Centralization—Radical Reorganization of Priorities Division

WASHINGTON, Feb. 5—The administration now looks confidently forward to the defeat of the Chamberlain bills providing for a War Cabinet and a Director of Munitions. Consideration of the latter measure, which is now on the Senate calendar, is to be prevented by parliamentary tactics, while the War Cabinet bill is to be smothered in committee. The basis of the confidence that neither of these bills will be passed is the assurance that has reached the White House from the majority leaders of both houses that with a few exceptions Senators and Representatives can be held in party alignment. As a change of five votes in the Senate as between the existing party contingents would upset this calculation, it is evident the majority leaders are counting upon the House as the Administration's final bulwark.

Mr. Coffin for Centralized Power

At an executive session held on Saturday at which the principal witness was Howard E. Coffin, chairman of the Aircraft Production Board, the committee devoted more than an hour to interrogating this manufacturing expert concerning the results which the country might look for in the way of production of war material under the present system. Mr. Coffin told the committee with great frankness that it would be folly to look for the full development of the productive capacity of the country unless all important Government purchases were placed within the jurisdiction of a centralized agency clothed with the fullest powers. While disavowing any intention of criticizing the work of any of the numerous officials who have been buying supplies for the Government, Mr. Coffin declared that there had been no definite program of placing war orders and that as a result the industries of the country contributory to the war were rapidly becoming demoralized. At present, he said, there was a total lack of co-operation on the part of the various departments and it would be impossible to avoid disastrous confusion unless a national policy respecting purchasing should be instituted at the earliest possible moment. Mr. Coffin strongly urged the creation of a body of some kind having the functions of a ministry of munitions without regard to the title that might be given it.

War Board Reorganization

While Secretary Baker's extended general statement before the Senate Military Committee is regarded as the administration's trump card in the defense of the War Department and in its opposition to the Chamberlain bills, it is understood that another card will be played at an early date in the announcement of the reorganization of the War Industries Board along lines intended to make superfluous the authorization of a Director of Munitions. This reorganization is to be effected coincidentally with the appointment of a successor to Daniel Willard, who recently resigned the chairmanship of the board. Bernard M. Baruch, it is rumored, will be the new chairman, and it is said that under his supervision the board will have delegated to it much more specific powers than it has heretofore possessed. Mr. Baruch, as well as Mr. Willard, Director Gifford of the Council of National Defense, and Mr. Coffin, has freely criticized the present organization of the War Industries Board, and has characterized the efforts of its members as an absurd waste of time in view of the purely advisory capacity in which the board heretofore has been able to act. Mr. Baruch has declared that while advisory boards and commissions may have had a more or less important function while the war machine was being organized, the day of their usefulness is past and they must now give place to bodies having definite executive powers.

Mr. Replogle's New Work

A radical reorganization of the Priorities Division of the War Industries Board was announced yesterday by the Council of National Defense in making public Priority Circular No. 3, defining the regulations to be enforced hereafter in determining precedence in orders and work. These regulations were drafted a month ago and without reference to the impending withdrawal of Chairman Willard and the various changes that have since taken place in governmental methods, especially in the War Department. It is an interesting fact also that at the time they were framed the Government had not taken possession of the railroads and Judge Robert S. Lovett was acting not only as Priority Officer on Transportation but also as the Chief of the Priorities Division of the War Industries Board in the granting of orders of precedence for war work. In the remodeled Division of Priorities, Judge Lovett's duties will be sufficiently enlarged to command his entire attention notwithstanding the fact that in transportation matters priority orders are now being issued by the Director General of Railroads. In the new organization, J. Leonard Replogle is assigned to service on the Priorities Committee and will have charge of steel distribution in accordance with the enlarged project covered by the modified regulations. It is the evident purpose of the Council of National Defense to retain Mr. Replogle's services, which have been of very great value to the Government.

The new regulations, which are subscribed to by the Secretary of War, the Secretary of the Navy, the Chairman of the Shipping Board, the President of the Emergency Fleet Corporation and the Chairman of the Council of National Defense, disclose a much wider field of operations than that defined in the first circular issued in September of last year. The regulations apply to all individuals, firms, associations and corporations engaged in the production of copper, iron, and steel and in the manufacture of their products; of chemicals, cotton duck, and woolen cloth, and all such other raw materials and manufactured products as the Committee may deem necessary from time to time.

The New Regulations

Under the new regulations, all orders and work are divided into four general classes instead of three as heretofore. The regulations in no way change or modify any priority orders previously issued.

"The paramount purpose of priorities," the circular says, "is the selective mobilization of the products of the soil, the mines, and the factories for direct and indirect war needs in such a way as will most effectually contribute toward winning the war. In requesting priority the petitioner should join with the committee in applying the test: *To what extent, if at all, will the granting of this application contribute, directly or indirectly, toward winning the war; and if at all, how urgent is the need?*"

Manganese Ore Imports a Record in 1917

Manganese ore imports continue to decline. For December they were 30,549 gross tons as compared with 44,141 tons for November, 1917, and with 49,796 tons in December, 1916. The total for 1917 was 629,972 tons which exceeds all previous records. It compares with 576,321 tons for 1916. The average monthly import rate in 1917 was 52,498 tons per month against 48,027 tons per month in 1916.

The West Virginia Fuel Administration has granted a permit to the Wheeling Can Co. to operate its plant at Wheeling, W. Va., on Mondays, heatless days.

Steel Turnings and the Electric Furnace

The great change in the value and use of steel turnings of all kinds which has recently taken place in England has been discussed by John A. Holden in a recent issue of the *London Iron and Coal Trades Review*. What he says has much practical value and is applicable to conditions in the United States. We quote:

A few years ago steel turnings were not in very much demand and good clean turnings could be bought for 30s. per ton. The price to-day for the same metal is about £4 per ton, a figure which would, no doubt, have been exceeded but for the intervention of the Ministry of Munitions. The reason for this appreciation is not difficult to seek. The raw material for the manufacture of electric steel in the arc type of furnace consists almost entirely of turnings. The writer refers to those furnaces which are worked with cold stock. Incidentally, it may be added, in this country very few furnaces are worked with liquid charges.

Fifty 3-ton electric furnaces would consume annually 150,000 tons of steel turnings. In addition, turnings often form a portion of an open-hearth charge and sometimes they are used in blast-furnace charges. For producing electric carbon tool steel, mild steel turnings from shells are in much demand. Nickel steel turnings are used for the manufacture of nickel steel ingots. With a suitable grade of scrap no addition of nickel may be required, because in any type of electric furnace there is no oxidation of nickel.

Similarly, nickel-chrome steel turnings may be profitably converted into nickel-chrome steel ingots. In acid lined furnaces there is little or no loss of chromium; in fact, the reactions in this furnace are comparable to those of the crucible process. In basic lined furnaces chromium may be retained or eliminated. In the former case the phosphorus would not be completely oxidized, but nevertheless it would be confined to safe limits. It follows that for the cheap production of alloy steels, such as nickel and nickel-chromium, scrap turnings containing the necessary elements should be used.

From an economic point of view, it is undesirable that alloy steel turnings should be used in charges where the alloying elements are not necessary or desirable. Many engineering establishments do not keep all these varieties of scrap separate. They may religiously look after high-speed steel, but other alloy steels are mixed with plain carbon steel turnings. In addition, the heaps of turnings sometimes become a dump for waste paper, or even worse refuse, etc. In those shops where the amount of scrap produced is very small, it may not be economically possible to separate the different varieties. Unfortunately there are works producing weekly as much as 100 tons of turnings consisting of only two varieties, yet they do not trouble to keep them separate.

One example will suffice to illustrate the loss when nickel steel is used in charges where nickel is not necessary. Fifty tons of 3-per cent nickel steel scrap contains £300 worth of nickel. Taking 50 tons as a weekly average, it represents potentially £15,000 per year. While every electric steel melter desires short, heavy turnings, it has been found practicable to crush the lighter turnings and obtain results equal to those obtained by the use of the more expensive and heavy turnings.

The California Foundrymen's Association of San Francisco in its publication *Chippings* for January has a notably readable and informative issue. It contains an article on the molding of bronze propellers at the Mare Island Navy Yard by T. C. Cleve, an article on cupola construction and a chapter of the "Book of a Thousand Excuses" for bad castings. William H. Thille, 522 Underwood Building, San Francisco, is secretary.

The Steel Sales Corporation, Adams and Jefferson streets, Chicago, has been appointed sole distributor in mid-West territory for the Electrical Alloy Co.'s grade A. Monel wire.

Electrical Machinery Developments

No unusual development work in electrical apparatus was brought to the fore in 1917. This the Westinghouse Electric & Mfg. Co. considers is due to the fact that the unprecedented demand for apparatus and appliances has called for abnormal efforts to speed up production, leaving little time or energy to be devoted to development of new apparatus or modifications of existing lines. The year, nevertheless, has not been barren of developments and some extensions have been made, but the main object has been the production of apparatus, especially since the country has been at war and the Government has been speeding up production in all the industries. The business which the company has done in the electrification of steel mills in 1916 and 1917 was more than ten times as great as the average of the five previous years.

In the arc welding field a new line of equipment having an operating voltage of 60 as compared with 75 volts which was formerly employed has been developed. This lowering of the voltage will result in a reduction in the amount of power consumed. In addition a line of portable outlet panels for use in connection with welding machines has been developed which will simplify the wiring of the shop.

In the year just closed the company has sold several generating units ranging from 40,000 to 70,000 kw. in capacity, those above 40,000 kw. being of the cross-compound or triple element type. Progress was also made in the sale of a number of generating units designed for use with waterwheels.

For metering the demand of large customers and also for portable service a line of motor-operated graphic instruments was developed. This includes voltmeters, ammeters, wattmeters and frequency meters and the same measuring element as that used in the line of solenoid-operated instruments now on the market is employed. In the new line the contacts of the measuring element actuate a small motor that drives the worm upon which the pen carriage is designed to travel.

British Steel Products in the Far East

A company has been recently formed in England, known as "Representation for British Manufacturers, Ltd." Its object is to open offices in the Far East with a view to bring before the Chinese buyer the products of the associated companies. Among the founders are some of the leading firms in various industrial branches. The methods of business representation in China usually adopted by British manufacturers have been indifferent and unbusinesslike. Greater initiative, however, is evidenced by the catalog in Chinese recently issued by the Representation company, to place before purchasers in the Far East the engineering products of the included companies. The catalog, which is well illustrated, covers cranes, structural work, cast-iron pipes, armor plates, gun forgings, rolling mills, shell and other presses, locomotives and other railroad rolling stock, wheels and springs, hammers, cast steel, high-speed steel, crucible cast steel, torpedo air vessels, projectiles, steel sheet-piling, coke oven plant, gas engines, gas plant, picks and shovels, machine tools, light railroad material, steamships, etc., besides other kinds of machinery and gear.

The Gold Medal Camp Furniture Co., Racine, Wis., on Jan. 31 distributed approximately \$20,000 in cash bonuses among its 150 employees in amounts ranging from \$25 to \$300, according to the length of service of each. The Gold Medal company has been executing large war contracts for the United States and foreign Governments since the outbreak of the war.

Oiling devices and oilers is the subject of the latest bulletin of a series of "Safe Practices" issued by the National Safety Council, Chicago. Numerous illustrations are given to indicate how dangers encountered by men doing the oiling are minimized. This includes extension oil cans.

Book Reviews

United States Artillery Ammunition, by Ethan Viall. Pages, ix + 98, 8 $\frac{1}{4}$ x 11 $\frac{1}{2}$ in.; numerous illustrations. Published by the McGraw-Hill Book Co., 239 West Thirty-ninth Street, New York, and for sale by THE IRON AGE book department. Price, \$2.

The book, which is a reprint of articles that have appeared in the *American Machinist*, covers the manufacturing methods employed in the Government arsenals for the production of 3 to 6 in. shrapnel and high-explosive shells and their cartridge cases. It is intended to give shop men, engineers and manufacturers an accurate knowledge of the dimensions, tools, shop-work and gages for the shells in most general use by the United States Army and Navy. The book is divided into six chapters, each of which deals with some particular type of shell. All of the chapters are illustrated by numerous line and halftone engravings. The index consists of several sections each referring to but one shell and a strict alphabetical arrangement is followed in all of them.

Heaton's Annual. Pages, 492, 4 $\frac{1}{2}$ x 7 $\frac{1}{4}$ in. Published by Heaton's Agency, 32 Church Street, Toronto, Canada. Price, \$1.25.

The fourteenth edition of this Commercial Handbook of Canada and Boards of Trade Register contains a list of Government officials, insurance companies, banks, railroad and steamship lines, together with postal, parcel post and cable rates, commercial regulations, custom tariff, information on the cost of travel, etc. The tariff adopted in 1907 is reprinted with the amendments to bring it up to date and an index is included to facilitate the finding of the provisions relating to any particular commodity. A number of examples giving the method of computing the duty are given, together with a digest of all of the bulletins issued by the customs department to its officials. The "Where to Find It" section has been amplified and serves as a guide to the reports of the dominion and provincial governments as well as the standard publications throughout the United States and Canada. Brief descriptions of the different towns of any commercial importance are given and are arranged alphabetically under the various provinces. The usual tables of exchange, weights and measures, etc., complete the book.

United States Rifles and Machine Guns. By Fred H. Colvin and Ethan Viall. Pages vii+332, 8 $\frac{1}{2}$ x 11 $\frac{1}{2}$ in.; illustrations, 2382. Published by McGraw-Hill Book Co., New York, and obtainable from THE IRON AGE book department. Price, \$3.

A complete description of the Springfield rifle model of 1903, and each operation involved in its manufacture, including 2337 illustrations, principally reproductions of detail drawings of each part with numerous figures makes up the bulk of this volume. The text is explanatory of the various processes and the 93 component rifle parts are each numbered and referred to throughout according to this classification. Chapters are devoted to the general specifications and to the operations on the barrel, receiver, bolt, sleeve, stock and other parts. Each operation is indexed and summarized. Synopses are also given of the evolution of the American military rifle; the British Enfield rifle modified for the American army abroad to take 30-caliber regulation United States ammunition; the United States automatic 30-caliber 1909 model machine rifle; the Lewis machine gun and the Vickers model 1915 machine gun.

The accompanying text is somewhat limited by the great mass of drawings, tables of operations, etc. The usefulness of the book as a guide rests largely on the detailed enumeration of shop practices which experience has shown essential to rapid and successful production, and an even fuller discussion of these points, especially of hazards to be avoided, might have added to its value.

A handbook entitled "Finding and Stopping Waste in Modern Boiler Rooms" has been compiled by George H. Gibson, assisted by Percy S. Lyon and has been

published by the Harrison Safety Boiler Works, North Philadelphia Station, Philadelphia. It has 276 pages, generously illustrated, and a price of \$1 has been put on it. While this book, which is addressed to power plant owners, managers, engineers and firemen, was planned originally as an advertising publication, there are only a few advertisements in the back of the book, the remainder being a compilation of recent information on the design, management and operation of steam boiler plants. The book is divided into five sections, treating of fuel, combustion, heat absorption, boiler efficiency and boiler plant proportioning and management. In each of these the subject matter presented is supplemented by tables and charts, etc., with references to the original authorities, which include many well-known engineers and writers in technical periodicals and authors of papers before engineering societies. Considerable information has been taken from the bulletins on the utilization of fuel issued by the United States Bureau of Mines. A table of contents and an alphabetical index provide a means for finding any desired information readily.

A pamphlet entitled "Eye Hazards in Industrial Occupations," by Gordon L. Berry, field secretary National Committee for the Prevention of Blindness, has been published by the National Committee for the Prevention of Blindness, 130 East Twenty-second Street, New York. The following selection of section headings indicates the scope of the book: Statistics of eye accidents; chipping operations; machine operations; abrasive wheels; sand-blasting; mushroomed tools; riveting; radiations from intense light and heat sources; radiant energy in arc welding and in molten metal; metallurgic operations; infections, and treatment of acid burns. These subjects have been treated for the information of the average manufacturer or layman. The book is undoubtedly the most complete compilation of material relating solely to the prevention of eye accidents that has been published in this country. A price of 50 cents has been put on it.

The 1918 revised edition of "The Modern Gasoline Automobile," by Victor W. Page, a book of 1032 pages, price \$3, has been issued by the Norman W. Henly Publishing Co., New York. The book, like the automobile itself, shows refinement and improvement, rather than any basic changes from former years. The latest types of automobile engines and bodies, with their various auxiliaries, are described and illustrated in the manner of a text book. The new matter largely covers tractors, cycle-cars and commercial automobiles in general. The war's influence appears in a number of illustrations of armored automobiles, mobile repair shops and military ambulances.

Keeping the Men in France Posted

Realizing that their employees now abroad with the American Expeditionary Force are eager to get letters and that next to hearing from home they are anxious to know something of what their friends also abroad are doing, so far as that can be told, officials of Pickands, Brown & Co., Chicago, have inaugurated a plan which may appeal to other companies which are well represented at the front. When a letter is received from abroad, copies are made and immediately mailed to other men from the company who are on the other side. Of course, in corporations with numerous departments, many men would not be sufficiently acquainted with each other to justify sending copies of the letters to all, and incidentally it would be too great and expensive a task, but many departments could at least look after their own men in the suggested way. Sending the letters would be unnecessary also where two or more men are in the same regiment or detachment and located at the same point.

The Newark Second Hand Machinery Co., 95 Chestnut Street, Newark, N. J., has changed its name to the Morris Machinery Co.

Machinery Markets and News of the Works

WIDE SEARCH FOR TOOLS

Government Takes Drastic Measure to Supply Needs

Builders Required to Give Lists of Purchasers for Past Twenty Years

The Machine Tool Section of the War Industries Board is taking drastic steps to procure the tools needed by the Government for important war work. Machine-tool builders are being asked to furnish lists of purchasers of certain tools for a period covering 20 years. Armed with these lists the Government will commandeer the tools, if necessary, in order to supply its arsenals and other war factories with the equipment they need.

Dealers in second-hand machinery have also been asked to give lists of the tools they own. Many brokers offer tools for sale which they do not own, and this practice, the Machine Tool Section says, has caused confusion. The Navy Department has asked dealers in New York to give lists of machine tools held in storage.

In New York a fair business is being done. The Duesenberg Motors Corporation, Newark, N. J., has received a contract for 2000 Bugatti aviation motors. The Sloan & Chace Mfg. Co., Newark, has bought a few tools for work on 3-in. guns of a howitzer type. The Watervliet Arsenal still has considerable equipment to buy. The Watertown Arsenal continues to buy.

New England is fairly active. The General Electric Co. is buying on a list of 60 tools issued in December. The New Britain Machine Co., New Britain, Conn., is buying for gun work. The Howard & Bullough American Machine Co., Pawtucket, R. I., has obtained a contract from the Watertown Arsenal. The Atlantic Corporation will buy quite extensively for its new shipyard at Portsmouth, N. H. The Groton Iron Works, Groton, Conn., is also about to buy for the Virginia Shipbuilding Corporation, Alexandria, Va.

In the Central West there is considerable small buying from scattered sources. The National Tube Co., the Hyatt Roller Bearing Co. and the Pennsylvania shops at Altoona, Pa., are among those inquiring or buying in Cleveland.

The announcement that the Ford Motor Co. will build submarine chasers for the Navy Department in its Detroit plant is of unusual interest. The Ford plant is well equipped and the new contract probably will not bring much new machinery business. The Detroit Shell Co., the Jackson Munitions Co. and the H. Mueller Mfg. Co. have been buying in Detroit.

Not much new business is reported from Chicago. Builders of machine tools in that territory are greatly handicapped by inability to ship because of railroad embargoes.

The Ordnance Department has awarded a contract for the construction of a \$4,000,000 shell-loading plant near Baltimore; also a contract for a \$1,500,000 auto-

mobile assembling plant near Baltimore. Contracts have been let for large powder plants at Charleston, W. Va., and Nashville, Tenn.

New York

NEW YORK, Feb. 5.

A fair business in machine tools is being done in this market. Such orders as are now being received would have been considered exceptionally good in normal times, but the volume does not compare with the large requirements which the trade was called upon to fill during the last half of 1917.

The Government is taking a keen interest in second-hand tools, but in attempting to locate equipment for prompt delivery has been confused by the duplication of offers by brokers, who do not own the tools they are trying to sell. Copies of advertisements have been sent to many dealers asking them to designate the tools which they own and which can be supplied at once. A letter, which comes from the Machine Tool Section of the War Industries Board, reads as follows:

"This department requires accurate information regarding available machine tools in order to provide for the needs of the Government. In order, therefore, to avoid the confusion resulting from duplicate listing of machines you are requested to check on the enclosed copy of your advertisement all such machines as you actually own and have in stock for immediate delivery, and to advise when they can be inspected and the price asked."

The Navy Department has sent to dealers a request for lists of machine tools held in storage in New York. The Chief Signal Officer of the War Department has sent out requests for catalogs, price lists and discount sheets. A number of machine-tool companies have sent representatives to Washington upon receipt of advices that large orders will be given out probably this week for various types of tools both for use in this country and abroad.

Owing to the many tools which the Government needs for its projects, manufacturers are finding it difficult to obtain A1 priority certificates, as both A1 and A2 classifications are being reserved largely for direct Government orders. Manufacturers having important war contracts have, in many instances, not received better than A3. A locomotive works is said to have made a protest because it was given only A4 priority.

The Duesenberg Motors Corporation, Newark, N. J., has received notification from the Government of cancellation of its contract for 500 Liberty motors and in substitution has received a contract for 2000 Bugatti aviation motors, an Italian invention. The present Duesenberg plant, which was but recently completed, will be doubled in size and considerable new equipment will be purchased.

The Sloan & Chace Mfg. Co., Newark, N. J., has received an order for 3-in. guns of a howitzer type and is buying a few new tools.

The Seaboard Air Line has come into the market for a few tools. There has been very little inquiry from the railroads as a result of Government control of their operation.

The Watervliet Arsenal, Watervliet, N. Y., still has considerable equipment to buy. The Watertown Arsenal, Watertown, Mass., is still buying.

New England machine-tool business is active. The General Electric Co. is buying on a list of about 60 tools, which was sent out in December. The list includes boring mills, milling machines, grinders, etc. The tools are for the Lynn, Mass., plant, which is engaged in making turbines. The New Britain Machine Co., New Britain, Conn., is buying tools for work on gun tubes. The Government is also to provide equipment for a gun-mount factory, adjoining the plant of the New Britain Machine Co. The gun-mount work will be superintended by the New Britain company, which is also engaged in making anti-aircraft guns. The Howard & Bullough American Machine Co., Pawtucket, R. I., maker of textile machinery, has accepted a contract for gun parts from the Watertown Arsenal. This company was about to accept a contract a few weeks ago for making gun mounts, but the negotiations fell through. The Knox Motors Co., Springfield,

Mass., has obtained from the Hapden Brass Co., Springfield, a contract for the machining of brass controller boxes. The Jones & Lamson Machine Co., Springfield, Vt., has bought several new tools. The Holtzer-Cabot Electric Co., Boston, has taken a contract to manufacture carbureters for an Ohio automobile manufacturer and will probably require additional equipment. The Meisel Press Mfg. Co., Boston, a printing-press concern, has taken a contract to manufacture parts of the Hispano-Suiza aviation motor from the Simplex Automobile Co. and has bought a few new tools.

The Atlantic Corporation, Portsmouth, N. H., has bought locomotive cranes and hoists for its shipyard and will also purchase additional equipment for its shops. The Groton Iron Works, Groton, Conn., has not yet closed for cranes and machines it will purchase for the new shipyard of the Virginia Shipbuilding Corporation at Alexandria, Va. The Newport News Shipbuilding & Dry Dock Co., Newport News, Va., placed an order with the Alliance Machine Co., Alliance, Ohio, for two 7½-ton traveling gantry cranes with cantilever extension. The crane business is not as active as it has been in the past six months, but several small inquiries are pending.

The Driver-Harris Co., Harrison, N. J., on the night of Jan. 31 suffered a loss by fire of its insulated wire and electrical cord departments. The buildings containing them have been completely destroyed. Its departments devoted to the production of resistance materials castings, cold-rolled strip, nickel sheet and other products are not in the least interfered with and business continues as usual.

The recent increase of the capital stock of the Armstrong Rubber Co., manufacturer of automobile tires, 118 Adams Street, Newark, N. J., was provided for to build and equip a new plant for turning out 500 tires and 1000 tubes per day. Plans for a plant equipped with the latest type machinery are now being drawn. G. F. Armstrong is president.

The Dover Boiler Works, Dover, N. J., manufacturer of boilers, furnaces, tanks and platework, has orders booked to keep the plant in operation at full capacity for the next 12 months. During 1917 its business increased so that it was necessary to erect an addition to the plant, increasing the output of finished material from about 5,000 tons to approximately 6,000 tons annually. It employs about 200 men.

The plant of the McKinnon Rockaway Axe Co., Rockaway, N. J., manufacturer of axes, was recently destroyed by fire.

The Standard Aero Corporation, Elizabeth, N. J., is building a two-story addition, 50x540 ft., to its plant at Linden.

Rapid progress is being made in the erection of a shell-loading plant for the Ordnance Department on property recently acquired at Morgan Station, near Perth Amboy, N. J. About 2,000 workmen are being employed on construction. The proposed new works are estimated to cost \$3,000,000.

The Bethlehem Steel Co., South Bethlehem, Pa., has completed arrangements for the erection at Mays Landing, N. J., of a plant equipped for loading 3, 6 and 8-in. shells, as well as for the manufacture of detonators. It will be constructed in units, and it is expected to have the first unit completed in 90 days. It is said that about 2000 men will be employed. A double-track railroad will be constructed to reach the plant. The F. H. Clement Co., Land Title Building, Philadelphia, has the building contract.

Fire Jan. 29 at plant No. 2 of the powder works of the E. I. duPont de Nemours Co., Carney's Point, N. J., caused a loss of about \$150,000.

The R. G. Mullens Mfg. Co., West Hoboken, N. J., has been incorporated in Delaware with capital of \$100,000 to manufacture motors, engines, etc., by Ralph G. Mullens, West Hoboken, John Massman and Samuel Janvier, New York.

The Joseph Dixon Crucible Co., Monmouth Street, Jersey City, has filed plans for two one-story extensions to cost \$11,000.

W. Ames & Co., Communipaw Avenue, Jersey City, manufacturers of bolts, railroad spikes, etc., have awarded contract for an addition to cost about \$10,000.

The United Motors Corporation, 29 West Forty-second Street, New York, has acquired the plant of the Hyatt Roller Bearing Co., Harrison, N. J., a subsidiary. The works consist of six, four and eight-story structures, with adjoining property at Middlesex and Fourth streets.

C. C. Galbraith & Son, 47 West Street, New York, manufacturers of marine hardware and supplies, have filed articles of incorporation with a capital of \$250,000.

The National Clutch Co., New York, has been incorporated with a capital of \$100,000 to manufacture clutches for automobiles. E. N. Baar and G. P. Empey, Brooklyn; and

F. V. Sheehan, 510 West 135th Street, New York, are the incorporators.

The West Virginia Pulp & Paper Co., 200 Fifth Avenue, New York, is having plans prepared for an addition to its works at Mechanicville, N. Y.

The Merrill Drop Hammer Co., Newtown, Long Island, has sold its property on Newtown Creek, 118x390 ft., to the Riverhead Eastern Oil Co., Pittsburgh, Pa.

The Melrose Tool Corporation, New York, has been incorporated with a nominal capital of \$5,000 by O. R. Lindgren and J. Carlsson, 316 East Fifty-seventh Street, to manufacture tools.

The Raymond Engineering Corporation, New York, has been incorporated with a capital of \$50,000 to manufacture metal specialties. B. Raymond and D. J. Reagan, 517 West 113th Street, and S. Behrman, 620 West 141st Street, New York, are the incorporators.

The Star Auto Radiator Works, Brooklyn, has been incorporated with a nominal capital of \$5,000 by M. and D. Gertel, and A. Stutman, 450 Georgia Avenue.

The United States Government, Navy Department, has awarded contract to the Marble Arch Co., Broadway and 216th Street, New York for erecting a new power plant at the Brooklyn Navy Yard to cost about \$255,900.

George H. Thatcher & Co., Leonard Street, Albany, have awarded contracts for rebuilding their two-story foundry and one-story machine shop, partially destroyed by fire recently.

Fire Jan. 30 destroyed a portion of the plant of the Esco Electric Co., Albany, with loss estimated at \$75,000, and the building of the Fairbanks Co., adjoining, with loss of about \$50,000.

The Mt. Vernon Die-Casting Corporation, Mt. Vernon, N. Y., has been incorporated with a capital of \$100,000 by J. Dix, B. Stahl and N. A. LeSavoy, 911 East 178th Street, New York.

The Moline Plow Co., Poughkeepsie, N. Y., manufacturer of farm machinery, is reported considering the erection of a new plant for the manufacture of tractors.

The Lloyd Engineering Co., Montclair, N. J., has filed notice of organization to operate a works at 460 Bloomfield Avenue for manufacturing couplings. E. Morris Lloyd, 26 Fairfield Street, heads the company.

The Astoria Boat Works & Marine Equipment Co., 561 Boulevard, Long Island City, N. Y., manufacturer of motor boats, life boats, etc., has purchased two tracts, about 100x100 ft., each at Walcott Avenue, Warren Street and Hancock Street, for extensions.

The Equitable Machinery Corporation, New York, has been incorporated with a capital of \$25,000 by T. F. and C. Husa and E. C. McManus, 400 West One Hundred and Sixtieth Street, to manufacture machinery.

The C. H. Radiator & Mfg. Co., New York, has been incorporated with a nominal capital of \$5,000 by C. H., and A. H. Lavaty, 1427 Avenue A.

The Controller Co., New York, has been incorporated with a capital of \$500,000 by F. Vehr, W. E. Miller and S. N. Taylor, 311 West Ninety-fifth Street, to manufacture calculating machines.

The American Iron Products Co., 50 West Street, New York, has increased its capital from \$25,000 to \$100,000.

The Eastern Foundry Corporation, Brooklyn, has been incorporated with a capital of \$20,000 by C. A. Weldon, H. Jacobson and W. Lowenthal, 35 Nassau Street, to manufacture foundry supplies.

The Casting & Supply Co., Jersey City, has filed notice of organization to operate a machine shop at 32 State Street. George J. Flushing, Jr., heads the company.

The General Lead Batteries Co., 4 Lister Avenue, Newark, will build a one-story extension, 55x80 ft.

The Hammered Piston Ring Co., Newark, has been incorporated in Maryland with a capital of \$1,400,000 by William Schmidt, 696 South Eleventh Street, Newark; Christian Schmidt and B. A. Brennan, Baltimore.

The plant of the Submarine Boat Co., Port Newark Terminal, Newark, N. J., sustained a loss of about \$300,000 from the fire on Jan. 26. The past week it has laid a fourth keel. B. L. Worden is general manager.

A one-story boiler plant and engine house will be erected by the Gamon Meter Co., 286 South Street, Newark, manufacturer of water meters.

The Aluminum Ware Mfg. Co., Newark, has been incorporated with a capital of \$1,000,000 by James H. Opp, Newark; George F. Bradenburgh, Irvington; and John E. Potter, Elmira, N. Y.

The Reliable Tool Co., Irvington, Newark, recently incorporated with a capital of \$125,000, is said to be planning the erection of a plant. Charles Katzan, Irvington, and Victor Katzan, Newark, head of the company.

The Alloys Mfg. Co., New York, has been incorporated with a capital of \$250,000 by H. C. Wing, M. M. Grunthal and C. W. Lucas, 27 Cedar Street.

The United States Magneto Co., New York, has been incorporated with a capital of \$10,000 by C. R. Allison, J. J. McGrath and A. L. Story, 128 Broadway.

W. H. Goehagen, Inc., has increased the capacity of its shipbuilding works on Jamaica Bay to provide for the construction of 30 barges at one time. The company has commenced the erection of an extension on a tract about 900x2000 ft., recently acquired on Adah Avenue, Arverne, and will devote it to the construction of barges about 32x100 ft., for Government service. It is expected to have the extension in operation in 60 days.

The Rust Proof Metal Seal Corporation, New York, has been incorporated with a capital of \$100,000 by I. M. Katz, A. A. Haskell and D. Wallace, 772 St. Nicholas Avenue.

The National Lead Co., 111 Broadway, New York, is having plans prepared for a six-story, brick and steel building, 60x210 ft., at Gold and Marshall streets, Brooklyn.

The Acme Scow Corporation, Roslyn, L. I., has been incorporated with a capital of \$200,000 by P. J. Dobson, J. A. Marden and G. V. A. McCloskey, 64 Wall Street, New York, to operate a boat works.

The Van Dyke Smelting & Refining Works, Brooklyn, has been incorporated with a capital of \$300,000 by E. Strauss, M. Mulstein and A. J. C. Weimer, 305 Woodbine Street, Brooklyn.

The S. & G. Machine & Tool Co., Brooklyn, has been incorporated with capital of \$6,000 by J. H. Good, G. R. Squires and E. J. Wick, 1259 Seventy-fifth Street, Brooklyn, to manufacture tools, etc.

The Newark Instrument Co., Newark, has been incorporated with a capital of \$175,000 by Daniel B. Smith, George W. McCarter and Conover English.

The Miss Liberty Knitting Needle Co., Newark, recently incorporated with a capital of \$5,000 to manufacture needles, has increased its capital to \$15,000. Ira A. Kay, Jr., South Orange and William R. Cook, Richmond Hill, L. I., head the company.

Buffalo

BUFFALO, Feb. 4.

The H. H. Franklin Mfg. Co., 302 South Geddes Street, Syracuse, manufacturer of automobiles, has received a contract from the Rolls-Royce Co., Derby, England, for parts for the Rolls-Royce airplane engine. The company will use a portion of its plant for the new work and has commenced the manufacture of tools, jigs, etc. It is expected to increase the present working force by over 1000 men to be used exclusively for engine part manufacture. H. H. Franklin is president.

Frank N. Trevor, 1392 Niagara Street, Buffalo, has completed plans for a machine shop addition at an estimated cost of \$9,000.

The Selden Motor Vehicle Co., Probert Street and East Avenue, Rochester, has awarded contract for the erection of a two-story addition, 160 x 200 ft., to cost \$100,000.

The plant of the Curtiss Machine Corporation, 1300 East Second Street, Jamestown, N. Y., which was recently damaged by fire to the amount of \$50,000, will be rebuilt.

The capital stock of the Pratt Chuck Co., Frankfort, N. Y., has been increased from \$55,000 to \$95,000 to provide funds for enlarging its plant and for additional equipment.

The Trescott Co., Inc., Fairport, N. Y., has been incorporated with a capitalization of \$100,000 to manufacture agricultural machinery. W. A. and E. L. Trescott and A. N. Leclair are the incorporators.

Extensive additions are contemplated this spring by the Smith Wheel Co., Inc., 101 North Geddes Street, Syracuse. The company's capital stock was recently increased from \$100,000 to \$300,000.

The H. E. Hessler Co., 512 North Salina Street, Syracuse, manufacturer of sheet metal products, is considering the erection of a new factory. The company has recently increased its capital from \$50,000 to \$110,000.

The Halcomb Steel Co., Geddes, N. Y., has increased its capital from \$3,000,000 to \$5,000,000. This is the second increase recently made by the company; in December an increase from \$1,800,000 to \$3,000,000 was authorized.

The Sanford Motor Truck Co., 107 St. Marks Avenue, Syracuse, manufacturer of motor trucks, has increased its capital from \$50,000 to \$250,000. It recently had plans prepared for the erection of an extension.

The Lumen Bearing Co., Lathrop Street, Buffalo, manufacturer of bearing metals and brass specialties, is planning for the erection of an addition to its brass foundry.

The Steinbrenner-Graf Co., Buffalo, has been incorporated with a capital of \$10,000 to manufacture carburetors, etc. William J. Steinbrenner, Arthur F. and George F. A. Graf, Buffalo, are the incorporators.

The Niagara, Lockport & Ontario Power Co., Marine Bank Building, Buffalo, recently merged with the Salmon River Power Co., has been granted permission to issue \$1,300,000 in convertible gold notes for extensions and improvements and for maturing obligations. The company has commenced the installation of a 15,000-hp. electric generating unit in its plant.

Fire, Jan. 28, caused a loss of about \$5,000 at the machine shop of W. W. Buxton, Ellicott Street, Batavia, N. Y.

The Rochester Molding Works, Rochester, has been incorporated with a capital of \$50,000 to manufacture moldings, farm implements and other products. G. M. Schmidt, G. Baxter and G. J. Skivington, Rochester, are the incorporators.

The Horton Machine Works, Inc., Elmira, N. Y., operating a plant on West Fourth Street for the manufacture of machinery, has been incorporated with a capital of \$50,000. J. R. and E. Horton, and J. Bochnewch, Elmira, are the incorporators.

The Porter-Cable Machine Co., Syracuse, manufacturer of machine tools, lathes and milling attachments, has increased its capital stock from \$100,000 to \$150,000. Walter A. Ridings is president.

The Atterbury Motor Car Co., Elmwood Avenue, Buffalo, manufacturer of automobiles, contemplates the erection of a one-story reinforced concrete addition to its plant.

The Buffalo Aeroplane Corporation, Buffalo, has been incorporated with a capital of \$100,000 to manufacture aircraft. L. R. Gulick, M. V. Moot and S. F. Carr are the incorporators.

Philadelphia

PHILADELPHIA, Feb. 4.

The Government has acquired about 400 acres on the site of the former Keystone State Fair Grounds, near Middletown, Pa., for a supply station for army service. It is said that the depot will cost over \$5,000,000 and give employment to about 5000 skilled men. Two reinforced-concrete and steel machine shops will be constructed for the manufacture of tools and equipment, and for repair work. An assembling works will also be erected.

The Penn Central Light & Power Co. and the Penn Central Power & Transmission Co., both of Altoona, Pa., have issued bonds for \$537,000 and \$20,000, respectively, for improvements, etc.

The Chester Shipbuilding Co., Chester, Pa., is having plans made for a punch shop and joiner shop. Headquarters of the company are in the Finance Building, Philadelphia.

M. E. Harriston, Parnassus, Pa., and associates have incorporated in Delaware the Duff Car & Gear Wheel Co., with capital of \$500,000 to manufacture car wheels, gears, etc. John T. Duff, Sr., and H. Y. B. Duff, Pittsburgh, are also interested in the company.

The Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., manufacturer of machinery, iron and steel castings, etc., has awarded contract to the McClintic-Marshall Co., Pottstown, for the erection of a 135-ft. extension to its foundry. The structure will be equipped with a crane and crane runway.

The York Tack & Nail Works, York, Pa., will erect a one-story addition, 27 x 44 ft.

The Lykens Valley Light & Power Co., Williamstown, Pa., has issued bonds for \$15,000 for extensions.

The White Motor Car Co., 216 North Broad Street, Philadelphia, has commenced the erection of its new service plant at Twentieth Street and Erie Avenue to cost \$300,000.

The Atlantic Refining Co., 3144 Passyunk Avenue, Philadelphia, is taking bids for a one-story car repair shop on Thirty-sixth Street to cost about \$30,000.

The Water Bureau of the City of Philadelphia is considering the erection of a hydroelectric power plant at Fairmount for operating its Belmont and other pumping stations.

The Enterprise Mfg. Co., Third and Dauphin streets, Philadelphia, manufacturer of iron and steel castings, etc., has filed plans for a one-story addition at Dauphin Street and Susquehanna Avenue, including a foundry extension.

The Bridgman Brothers Co., Philadelphia, formerly operating a foundry at Fifteenth Street and Washington Avenue, recently sold to the Government, has purchased a two-story foundry building, with site 80 x 372 ft., on Thirty-fourth Street, near Chestnut Street, from the J. G. Brill Co. The company, specializing in plumbing and heating supplies, will use it as a new works.

The Acme Sanitary Pottery Co., May Street, Trenton, manufacturer of sanitary earthenware, has acquired the former plant of the Trenton Welding & Cutting Works, May Street and Kirkbride Avenue, adjoining its plant, for extensions.

The directors of the School of Industrial Arts, Trenton, have authorized the completion of plans and estimates for a shop addition to the school to cost \$30,000. It will be two-story and basement, 70 x 80 ft., with one-story extension, 20 x 40 ft. Frank Forrest Frederick is director of the school.

The Milton Mfg. Co., Milton, Pa., manufacturer of bolts, nuts, rivets, etc., has awarded contract for a one-story machine shop, 50 x 300 ft., to cost \$15,000.

The Benzol Products Co., Marcus Hook, Pa., will build two one-story additions, 120 x 145 ft., and 35 x 39 ft.

Baltimore

BALTIMORE, Feb. 4.

The Ordnance Department has awarded contract to the Mellon-Stuart Co., Pittsburgh, for the construction of a shell-loading plant at Edgewood, Md., to consist of about 45 buildings, estimated to cost \$4,000,000. The department has also awarded a contract to Edward O. Scheidenhelm & Co., Fifth Avenue and Twenty-sixth Street, Chicago, for the construction of an automobile assembling works at St. Helena, near Baltimore, to cost about \$1,500,000. It will consist of several buildings, with a main works, 480x500 ft. The other structures will be 136x720 ft., and smaller.

The Ball Grain Powder Co., Wilmington, Del., recently incorporated, has had plans prepared for a one-story shell-loading works at Miller Road and Thirty-second Street.

The Ordnance Department is planning the erection of a repair plant at Camp Gordon, Ga., for automobile and motor-cycle work.

The Continental Can Co., Keyser Building, Baltimore, is taking bids for a two-story addition to its plant at Orangeville, Md., 35x100 ft.

The H. E. Crook Co., Inc., Light Street, Baltimore, is having plans prepared for rebuilding its shipbuilding plant at Locust Point, recently damaged by fire with loss of about \$50,000. The improvements are estimated to cost \$75,000. Howard E. Crook is president.

The Wheeling Mold & Foundry Co., Wheeling, W. Va., manufacturer of iron and steel castings, is planning the construction of additions to its Peninsula works, together with improvements in its local plant, to cost about \$150,000. The extension will provide increased capacity for handling a Government order for 16-in. gun slides.

The Helmick Foundry-Machine Co., manufacturer of mining cars, Fairmount, W. Va., is planning the erection of a one-story addition 35x45 ft. to cost \$6,000.

The Leader Plow Works, Staunton, Va., is planning the erection of an extension.

The Kingan Co., Fifteenth Street, Richmond, Va., will erect a one-story addition to its machine shop, 26 x 35 ft., to cost \$15,000.

A one and two-story, brick and reinforced-concrete repair shop to be used for army equipment, motorcycles, etc., will be erected by the Ordnance Department at Atlanta, Ga., at an estimated cost of \$1,000,000.

The Williams Shipbuilding Corporation, Tampa, Fla., recently organized, has acquired a local site and plans to erect a plant for the construction of steel vessels. It will start operations with the construction of five steel tugs for ocean service and six steel barges. R. M. Williams is president.

The Eaton Iron Works, Lakeland, Fla., has been incorporated with a capital stock of \$25,000 to operate a foundry and machine shops. O. M. Eaton is president, Guy W. Toph is vice-president, A. C. Van Hooydonk is general manager, and L. F. B. Eaton is secretary and treasurer.

The Bartlett-Hayward Co., Scott and McHenry streets, Baltimore, has awarded contract to Morrow Brothers, Fidelity Building, for the construction of a one-story carpenter shop, 32 x 80 ft., to cost \$8,000.

The Maryland Brass & Metal Co., Calvert and Federal streets, Baltimore, has increased its capital stock from \$50,000 to \$150,000.

The Cameron Stove Co., Richmond, Va., plans to enlarge its foundry.

Chicago

CHICAGO, Feb. 4.

Factory shipments of machine tools were so poor in the first three weeks of January that it was expected the month would show a serious reduction as compared with December and November. In the last week of the month there was a material improvement, but still it did not make as good a showing in the matter of shipments as did the two previous months. The cause of the slump, of course, was the inability of the railroads to haul freight of many kinds, including machine tools. Much as planers are needed, for instance, a manufacturer was unable to induce the railroad serving him to take loaded cars away from his plant. In addition to the machines on cars, others were waiting to be loaded.

With all selling agencies the securing of shipments has continued a most serious difficulty. There is no trouble selling, if tools can be shipped, it being understood, of course, that the purchaser holds a Class A priority certificate. About all that is available for ordinary domestic buyers are odds and ends not in demand for munitions work. New instances are constantly coming to light where tools purchased months ago by buyers not entitled to priority have been diverted to war contractors by order of the Government. The Santa Fe Railroad has been one of the sufferers, orders being wired to tool builders to divert tools which the railroad had on order. In such cases, it is promised that shipment will be made from a subsequent lot going through the factory, but there always is likelihood of a repetition of the commandeering. In this connection it is interesting to note that in some cases at least the original seller of a tool gets his commission, despite the diversion in shipment.

The trade is giving thought to what will be the ultimate situation resulting from the mass of data which the Machine Tool Section of the War Industries Board is collecting, but there can be no answer yet, as all depends on the extent to which Governmental requirements expand. Not only must tool builders file schedules as to their capacity, the orders they have booked and the machines they are building, but they also must supply the names of those to whom they have sold machines, of types which are sought, going back 20 years. The purpose of all this data is to enable the Government to locate the machines listed in its recent appeal to owners.

Dealers also have evidence that the Machine Tool Section is seeking to fix the ownership of second-hand tools. Some of them have received copies of their advertisements in THE IRON AGE and other trade papers, in which they list what they offer for sale, with instructions to check all the tools which they actually own. In most cases this means that all of the tools listed will be checked, but there are some exceptions.

With all the difficulties and uncertainties in the way of doing business, large sellers found the volume of January sales better than normal, and would be well satisfied if every month of the year maintained the same level.

A. S. Alschuler, architect, 28 East Jackson Boulevard, Chicago, is taking bids on a one-story factory, 300 x 300 ft., at Sixteenth Street and Kilbourne Avenue, for the Roth Mfg. Co., manufacturer of car heating apparatus, 118 South Clinton Street, Chicago.

Van Effen Brothers, 1436 111th Street, Pullman, have been awarded the general contract for a one-story foundry, 180 x 220 ft., at 13600 Brandon Avenue, for the Western Car & Foundry Co., 13600 Brandon Avenue, Hegewisch. It will be of steel and cost \$60,000.

The plant of A. C. Clark & Co., 1035 East Seventy-sixth Street, Chicago, which is manufacturing aeroplane parts, was damaged Jan. 30 by fire to the extent of \$25,000 to \$50,000.

A fire, preceded by an explosion, did damage estimated at \$50,000 to a storage building, occupied by the Toro Motor Co., 570 North Prior Avenue, Minneapolis, Minn. The company has Government contracts, but these are being filled at other plants.

The Chicago & Eastern Illinois Railroad, Chicago, is rebuilding its machine shop and engine house at Salem, Ill., recently damaged by fire. The new structures will cost about \$300,000.

The Peoria Foundry Co., Peoria, Ill., has been incorporated with a nominal capital of \$5,000 by James Fitzgerald and Joseph F. Hadank, Peoria, to manufacture castings.

The Standard Forgings Co., Indiana Harbor, Ind., has awarded contract for an addition to cost about \$15,000.

The machine shops and blacksmith works of the Seneca Copper Co., Calumet, Mich., were destroyed by fire on Jan. 24, including equipment.

The Badger Mfg. Co., Chicago, has been incorporated in Delaware with capital of \$300,000 by E. J. Cunningham, Chi-

cago; H. W. and Walter H. Schwab, Milwaukee, to manufacture automobile parts.

Fire destroyed the plant of George Meikle, Springfield, Ill., manufacturer of automobile parts, Jan. 29, with a loss of about \$18,000.

Henry G. Lange, 162 North May Street, Chicago, is building a one-story foundry at 1100 Fulton Street, 75 x 100 ft., to cost \$16,000.

The American Airship & Transportation Co., Kansas City, Mo., has been incorporated in Delaware with a capital of \$2,000,000 by J. W. Graves, W. H. H. Leach, C. A. Roff and J. W. Brown, all of Kansas City, to manufacture airplanes.

The Alexander Mfg. Co., Ames, Iowa, manufacturer of garden plows, etc., is considering the erection of a new one-story plant, 50 x 150 ft.

The Victor Mfg. Co., Leavenworth, Kan., manufacturer of electric washing machines, etc., has recently secured \$60,000 additional capital by the issue of preferred stock and with these funds intends to double its output. It will build a two-story connecting building between its present structures. F. J. Tallant is president.

The Whitnell Mfg. Company, manufacturer of ventilating windows for farm buildings, will not rebuild its plant at Kingsley, Iowa, recently damaged by fire, but will remove to Des Moines, where it will expand its operations. Charles Whitnell is president.

Milwaukee

MILWAUKEE, Feb. 4.

An outstanding feature in the metal-working industry of this section is the unusual activity in farm tractor manufacturing. Gas engine builders are developing tractor manufacture to an exceptional degree and many companies are making large increases in capital stock to enable them to adequately handle the enormous demand for such machinery. Jobbing foundries report a constantly broadening demand for agricultural castings for all types of power-driven farm machinery.

The demand for milling machines and other machine tools continues. Automobile shops which are devoting increased capacity to various phases of Government requirements are among the heaviest buyers. The demoralized condition of railroad traffic has hampered deliveries from local shops, but improvement is becoming noticeable once more. Tool builders are making excellent headway in catching up with orders and are now able to quote nearer delivery. On some types delivery is being designated as near as March, while on others quotations are for July and August delivery.

The LaCrosse Tractor Co., LaCrosse, Wis., at its annual meeting voted to increase its capital stock from \$1,500,000 to \$2,500,000 to accommodate the growth of its business the past year, and a large volume of foreign and domestic orders are now being executed. The company is now employing 400 men and is preparing to increase its facilities, which were enlarged about 100 per cent during 1917. B. F. Hamer is general manager.

The Brillion Iron Works, Brillion, Wis., has increased its capital stock from \$60,000 to \$100,000 to compensate for the expansion of its business. It manufactures gas engines, clod crushers and does commercial foundry and machine-shop work. Henry Ariens is president and general manager.

The Industrial Iron Works, Inc., Milwaukee, has been incorporated with a capital stock of \$25,000 to manufacture special machinery. For the present the machinery will be made under contract with local foundries and machine shops, but later the company hopes to establish a plant of its own. Offices have been opened at 704 Railway Exchange Building, in charge of Philip A. Singer, consulting and designing engineer, who is at the head of the company. With him are associated C. Morris Thorkildsen and S. C. Weber.

The George H. Smith Steel Casting Co., 500 Clinton Street, Milwaukee, will erect a four-story foundry and pattern shop addition and office building, 75x95 ft., costing \$50,000. The architects and engineers are Klug & Smith, Mack Block.

The Chicago, Milwaukee & St. Paul Railway Co. is preparing to raze the present division machine and repair shops at Portage, Wis., and erect a new group costing about \$75,000 with equipment, to include all division offices of the LaCrosse division, now located at Milwaukee. New shops and headquarters for the Northern division are contemplated at Horicon River, Wis. J. A. MacDonald and B. F. Van Vliet are superintendents of the LaCrosse and Northern divisions, respectively.

The Ozone Co., Milwaukee, has been incorporated with a capital stock of \$25,000 to manufacture sanitary devices and appliances. The incorporators are Julius E. Kiefer, William J. Eberle and E. T. Zautcke.

The Farm Tractor Co., Fond du Lac, Wis., has changed its corporate style to Fond du Lac Tractor Co. to better designate its location and to avoid confusion with other companies in the same line of production. The capital stock is \$20,000 and the principal officers are Fred J. Rueping, president, and M. M. Cory, secretary.

The Turner Mfg. Co., Port Washington, Wis., manufacturer of gas engines, farm tractors and other farm machinery, has increased its capital stock from \$150,000 to \$250,000, the new issue consisting of 7 per cent preferred stock, part of which will be placed on the market. The company expects to manufacture from 400 to 500 farm tractors during 1918. L. M. Turner is vice-president and general manager.

The Electric Welding & Mfg. Co., Milwaukee, has been incorporated with a capital stock of \$10,000 by George F. Luehring, Joseph Stika and Oscar Greulich. It will engage in the machine-shop business and specialize in repairs by the oxy-acetylene process as well as manufacture seamless goods. Plans have not been fully matured.

The C. A. Lawton Co., DePere, Wis., founder and machinist, has broken ground for a new pattern shop and storage building to replace the structure recently destroyed by fire. The investment will be about \$20,000. The Lawton company is doing its own work under the direction of P. T. Benton, architect, Green Bay.

Paul Jackson, New Glarus, Wis., has sold his machine-shop and business to Hoesly & Krieg, Monticello, Wis., who will consolidate their shops at the latter point.

The Benson Speed Signal Co., Madison, Wis., has been organized with a capital stock of \$100,000 by Hal R. Martin, Louis W. Wiedenbeck and Dr. A. D. Campbell, Madison, to manufacture speed-metering and signal devices.

The Northern Boiler & Structural Works, Appleton, Wis., will take bids about Feb. 15 for a one-story shop addition, 100x150 ft., to cost about \$25,000 without equipment. Plans are being completed by C. H. Williams, architect, Green Bay, Wis. H. H. Timm is general manager.

The Booth Fisheries Co., Chicago, is preparing to build a new cold storage warehouse and refrigerating plant at Bayfield, Wis., to replace the group destroyed by fire on Jan. 18, with an estimated loss of \$50,000.

The Chicago & Northwestern Railroad Co. will build a new roundhouse and repair-shop at Montfort, Wis.

The main building of the Lake Superior Iron & Metal Co., Ripley, Mich., was recently damaged by fire to the amount of \$10,000.

Detroit

DETROIT, Feb. 4.

The Ford Motor Co. will soon be engaged on Government work to 75 per cent of its capacity. It now employs 30,000 men and is making Liberty aviation motors, cylinders for aviation motors, gun caissons and ambulances. In addition, it is reported that the company has just accepted a contract from the Navy Department for submarine chasers of a new type. These ships will be 200 ft. long and will have a displacement of 500 tons. They will be completely fabricated in the Ford plant, which will also manufacture the turbines and other equipment. It is announced unofficially that as soon as the first boat is completed one will be turned out every day.

Munitions work is very active in the Detroit territory. Two or three new lists of tools to be bought will be issued very soon. The Detroit Shell Co., the company headed by John Kelsey, which was awarded a \$30,000,000 contract from the Government, has been making purchases during the past week. The Jackson Munitions Co., Jackson, Mich., a new company headed by C. B. Hayes of the Hayes Wheel Co., that city, has also been in the market. The Studebaker Corporation and Dodge Brothers have also bought machine tools for Government work. The H. Mueller Mfg. Co. has placed fairly large orders for its plant at Decatur, Ill., and its new plant at Port Huron, Mich. Machine tool inquiry comes almost entirely from companies having Government contracts.

The coal situation locally and in the State shows no improvement. Each day sees more plants shutting down because of the lack of fuel. The situation now threatens a general paralyzing of industry, including shops engaged on Government contracts. Those industries still at work are operating on a day-to-day basis. The Detroit City Gas Co. last week appealed to all industrial users of gas to stop their consumption for the present, as the city's gas supply is practically exhausted and no coal is on hand to replenish it. The Ford Motor Co. is the largest industrial user of gas in

the United States. The Chalmers Motor Co., Cadillac Motor Co., Continental Motors Co., Lincoln Motor Co., Timken-Detroit Axle Co., Studebaker Corporation and other large consumers of gas have agreed to discontinue its use until the gas company's fuel situation is improved. This will mean the throwing out of work of thousands of men.

The Jackson Munition Corporation, Jackson, Mich., has filed articles of association with a capitalization of \$500,000. Clarence B. Hayes of the Hayes Wheel Co. is president.

The Acme Motor Truck Co., Cadillac, Mich., will increase its capital stock to \$750,000 common and \$250,000 preferred. The common stock now outstanding amounts to \$280,000.

Indianapolis

INDIANAPOLIS, Feb. 4.

The Gillette Motors Co.'s plant at Mishawaka, Ind., taken over by Melville W. Mix, president Dodge Mfg. Co., will be used in filling Government ordnance contracts.

James I. Dissette, vice-president and secretary of the Indianapolis Wire Bound Box Co., has bought the plant of the Interior Hardware Co. at Linden Street and the Belt Railroad, consisting of three brick buildings with 50,000 sq. ft. of floor space. The box factory was one of the sufferers by the Industrial Building fire, January 13 and had to find new quarters.

The Weidely Motors Co., Indianapolis, has increased its capital stock from \$1,100,000 to \$1,500,000.

The Indiana Steel & Wire Co., Muncie, Ind., has increased its capital stock from \$150,000 to \$450,000.

The Maxwell Mfg. Co., New Castle, Ind., has obtained Government contracts for ordnance supplies which will keep the plant operating at capacity for 10 months. It will spend \$80,000 for new machinery.

The Shotwell Pump & Tank Co., Indianapolis, has increased its capital stock from \$100,000 to \$200,000.

The Noble Heater Co., Kendallville, Ind., has been incorporated with \$300,000 capital stock, to manufacture heaters for automobiles. The directors are Gilbert A. Bartholomew, Clarence E. Baker and William S. Baker.

The Schroeder Headlight & Generator Co., Evansville Ind., has been incorporated with \$150,000 capital stock. The directors are J. Henry Schroeder, Marcus S. Sonntag, William H. McCurdy, John D. Craft and William A. Carson.

Cleveland

CLEVELAND, Feb. 4.

While no large orders or inquiries for machine tools came out the past week a good volume of business was done in small lots. This came from scattered sources, but largely from companies having Government work. There is no demand from automobile or rubber tire manufacturers. Orders for several machines were placed by the Cleveland Tractor Co., which is still in the market for additional equipment. The National Tube Co. is inquiring for a 24-in., 36-in. and 48-in. lathe, planer and shaper for its Lorain plant. The demand for turret lathes is more active than for several weeks. Orders for six large machines for the Pennsylvania shops at Altoona, Pa., and for 12 machines for the Hyatt Roller Bearing Co. were received the past week by a local builder of turret lathes. Considerable demand for turret lathes for export to England is now coming in. The call for small drilling machines has eased up and prompt delivery can be secured. The Navy Department has received bids for a 250-ton gun-handling gantry crane for the Sandy Hook proving ground. The two lowest bidders were builders in this territory.

The Standard Parts Co., Cleveland, has placed a contract for the erection of a heat-treating plant in connection with its Perfection spring works.

The Ohio Shipbuilding Co., Cleveland, has been organized to establish a plant on the Upper Cuyahoga River, near the Erie Railroad bridge. It will devote its attention largely to repair work on Lake boats.

The Wendland Engineering & Metal Products Co., Cleveland, has been incorporated with a capital stock of \$100,000 by Joseph G. Wendland, Julius Block, and others.

The Cornwall Mfg. Co., Penobscot Avenue and East 128th Street, Cleveland, manufacturer of sheet metal specialties, is in the market for an 8-ft. power squaring shear, and will probably require several seaming machines.

The Peerless Pattern Works Co., Cleveland, has been incorporated with a capital stock of \$10,000 by Neil Brogan, M. D. Bracken, and others.

The P. A. Geler Co., Cleveland, has increased its capital

stock from \$150,000 to \$250,000 to take care of its growing business. No immediate extensions are contemplated.

An extension, 90 x 100 ft., to be erected by the Monarch Brass Co., Cleveland, will be used for foundry purposes. Orders have been placed for all the additional equipment.

The Lima Rivet & Forging Co., Lima, Ohio, recently incorporated with a capital stock of \$300,000, has completed its organization and elected W. L. Russell, president; W. M. Myers, formerly manager of the Lima Locomotive Works, vice-president and general manager, and T. N. Cunningham, secretary and treasurer. These officers, with A. W. Wheatley, president Lima Locomotive Works, E. W. Hiner and Frank Collucci, comprise the board of directors. The company is equipping a plant for the manufacture of a patented type of rivets.

The Machine Parts Co. and the Worthington Co., Elyria, Ohio, have been merged into a corporation to be known as the Colson Co., to manufacture children's vehicles and screw machine products. J. P. Brophy is chairman; F. W. Colson, president; John Murbach, vice-president; H. W. Ingersoll, secretary, and Thomas N. Cook, treasurer.

The Dall Motor Parts Co., Vermilion, Ohio, is having plans prepared for an addition.

The Fisher Mine Equipment Co., East Liverpool, Ohio, has been incorporated with a capital stock of \$25,000 by Roy A. Fisher, Charles A. Morgan, and others.

It is announced that the plant of the Ohio Goods & Mfg. Co., Akron, Ohio, which recently suffered a fire loss of about \$175,000, will shortly be rebuilt.

Cincinnati

CINCINNATI, Feb. 4.

The high water in the Ohio River caused a number of manufacturing plants to shut down, although no machinery firms were affected. The shortage of coal, however, resulted in the closing of three or four machine-tool plants, last week but supplies now coming in have enabled them to resume operations.

The Navy Department has lately placed a number of orders for lathes and other machine tools. Orders from other Government departments are not quite as heavy as they have been, but this is believed to be only a temporary let-up. Every shop is working to capacity with the exception of those not holding exemption orders to operate Mondays.

The union pattern makers made a demand last week for an advance in wages to 75c per hr. As far as is known this has not been granted.

Nearly all the storage rooms of machine-tool companies are filled with machines that are impossible to ship on account of freight embargoes.

The R. K. LeBlond Machine Tool Co., Cincinnati, is having plans prepared for an addition to its plant in Hyde Park to contain 30,000 sq. ft. of floor surface. It will be used mostly for storing and cleaning castings.

The Butler Brothers Piano Mfg. Co., Cincinnati, has been incorporated with \$60,000 capital stock by N. M. Butler and others. It heretofore operated under a partnership and will fit up part of its plant for the manufacture of airplane parts.

The Oesterlein Machine Co., Cincinnati, will soon begin removing its equipment to the plant of the Samuel C. Tatum Co., on Colerain Avenue, which it recently purchased.

The Pollak Steel Co., Carthage-Cincinnati, has commenced work on additions to its plant.

The National Cash Register Co., Dayton, Ohio, has acquired a site adjoining its plant and, it is reported, intends erecting an addition for the manufacture of war munitions.

The Recording & Computing Machines Co., Dayton, will build an addition to its plant on Miami Chapel Road for the manufacture of munitions for the Navy Department.

The Dayton Fan & Motor Co., Dayton, suffered a fire loss last week, estimated at \$50,000. Rebuilding plans are under way.

The Dayton Bronze Bearing Co., Dayton, will make an addition to its plant for which some foundry equipment will be required.

It is reported that the National Artificial Refrigerating Co. will remove its plant from Wapakoneta to London, Ohio, and will increase its present capacity.

The Standard Slag Co., Ironton, Ohio, will rebuild its plant recently destroyed by fire.

The Marietta Silo Co., Marietta, Ohio, contemplates the erection of a new factory that will enable it to increase its present output.

The Central South

LOUISVILLE, Feb. 4.

Milder weather in this section the past fortnight has had the consequent effect of improving all lines of business. Local transportation conditions, except as affected by embargoes, have improved and coal is more generally available. Foundries and machine shops are extremely busy and a considerable amount of repair work and remodeling of ice machinery is in prospect.

Mayfield, Ky., has issued \$272,000 in bonds and will take over and improve the local water and light plant.

The Walton Electric Light Co., Walton, Ky., proposes to install an electric generator to be direct connected to an engine now in operation. E. L. Kelly is manager.

Bert L. Sylar, James Building, Chattanooga, Tenn., is in the market for eight small capacity steam shovels mounted on wheels.

The John G. Duncan Co., Knoxville, Tenn., is asking for prices on locomotive boilers of 15, 20, 25, 30, 40, 50, 60 and 75 hp. on skids and wheels, guaranteed at 100 lb. per sq. in. working pressure. Also prices on double-cylinder, double-drum hoisting engines, 7½ x 10, 8 x 10, or 8¼ x 10 in., double friction or link motion, former preferred, with and without boilers.

The Harriman Foundry & Machine Works, Harriman, Tenn., has purchased the property of the Harriman Cotton Mills Co., which it will remodel for the manufacture of mine car wheels and contractors' equipment. Electric power will be used, with individual motor drive.

The Wytheville Garage, Wytheville, Va., is asking for prices on electrical equipment, including an air compressor and battery charging outfits.

The Lenoir Car Works, Lenoir City, Tenn., plans to rebuild along larger and more modern lines its blacksmith and machine shop, totally destroyed on the morning of Jan. 10 by fire originating from an unknown source. The engineering and building will be done by its own organization, and it does not contemplate any radical changes other than the installation of an overhead crane. The plant has not been, and will not be, seriously handicapped except in this particular department, and the output of freight cars and foundry products will not be seriously interrupted. H. N. Curd is manager.

The Biloxi Machinery Works & Foundry Co., Biloxi, Miss., has been incorporated with a nominal capital of \$5,000 by J. R. McElroy and Albert Babendreer.

Fire, Jan. 27, destroyed the plant of the Laurel Gin & Fertilizer Co., Laurel, Miss., with loss estimated at \$50,000.

The Ordnance Department, Washington, will build a new hydroelectric power plant at Muscle Shoals, near South Florence, Ala., on the Tennessee River to cost about \$13,000,000. It will be used for operation of the Government nitrate plant to be constructed in this vicinity.

California

LOS ANGELES, Jan. 29.

The Pacific Electric Railway Co., Pacific Electric Building, Los Angeles, is having plans prepared for the erection of 14 new shop buildings at its works at Torrance, including machine shops and forge works. The total cost is estimated at about \$1,000,000.

R. A. Summers, Pasadena, is considering the establishment of a plant for the manufacture of a patented metal farm gate.

The Hendrie Rubber Co., Los Angeles, has been incorporated with a capital of \$250,000 to manufacture rubber goods. E. S. Dulin, J. H. Schenck and W. C. Hendrie, Los Angeles, and W. F. Stevens, Pasadena, are the incorporators.

The Dustin-Roman Auto Top Co., Los Angeles, recently incorporated with a capital of \$25,000, will include a complete body-building department in its new factory, in course of construction at Figueroa and Ottawa streets. This section of the works will be equipped to convert old automobile bodies into new models, and will be supplemented by other departments for the manufacture of seats, tops, covers and other specialties. It is expected to have the plant ready for occupancy in about five weeks. George F. Dustin is head of the company.

The Los Angeles Shipbuilding & Drydock Co., Los Angeles, is reported to be contemplating the construction of a new plant at Los Angeles Harbor, in connection with its works at San Pedro.

The Landis Electric Co., San Diego, has been incorporated with a capital of \$25,000 to manufacture electrical specialties.

H. G. Landis, Edward Jewell and Arthur J. Simpson are the incorporators.

The Cousins Tractor Co., Hanford, Cal., manufacturer of farm tractors, contemplates the erection of a new plant to cost about \$30,000.

The Pacific Electro Metal Co., San Francisco, is building a new plant at Bay Point, which will be electrically operated, with power furnished by the Great Western Power Co. It is expected to have the first unit in operation at an early date.

The Pacific Northwest

PORTLAND, ORE., Jan. 30.

Notwithstanding constant efforts to keep up the output of lumber throughout the Northwest, there has been some falling off owing to unfavorable weather. An increasing demand for logging machinery is coming from the spruce districts of Oregon, Washington and British Columbia. The car situation is improving and machinery and other supplies are arriving in better time. Practically every steel shipbuilding plant in the Puget Sound and Columbia River district has extensions in plan or under way.

The Portland Shipbuilding Co., Portland, has secured 650 ft. of frontage on the Columbia River with a depth of 400 ft., and will remove its plant to the new site this month.

The Rhodes Harvester Co., Spokane, is having plans drawn for a new foundry and other additions to its plant at Dishman.

The Doud-MacFarlane Machinery Co., Tacoma, has sold its marine accessory line and will increase its facilities for manufacturing galvanized and brass port lights and anchors.

J. Coughlan & Sons, Vancouver, B. C., report four additional contracts to build 8800-ton steel steamers for the Imperial Munitions Board, in addition to six under construction.

The Albina Engine & Machine Works, Portland, has been awarded contracts for four steel steamers of 4600 tons capacity each.

The Oakland Planing Mill Co., Oakland, Ore., will move its plant to Cottage Grove, Ore., where it will be combined with that of the Cottage Grove Planing Mill Co. and enlarged. Considerable new machinery will be installed.

The Canadian Metal & Equipment Co., Vancouver, B. C., has secured a site on which it will erect a smelting plant to cost \$6,000,000. Plans have been completed and bids will be called for shortly.

The Aerial Navigation Corporation, Spokane, Wash., contemplates the construction of an airplane plant near that city. It holds contracts for several standard biplanes. M. G. Johnson is president.

The Grays Harbor Motorship Corporation, Aberdeen, Wash., has purchased the machinery of the Grays Harbor Iron Works, Hoquiam, which it will install in its new machine works.

J. T. Robinson, Kamloops, B. C., and associates plan the erection of a shipyard on the Fraser River, near Vancouver.

Charles Bell, Hoquiam, Wash., has purchased the foundry of the Grays Harbor Iron & Steel Co., which he will convert into a machine shop.

The Vancouver Flour Mills, Vancouver, Wash., recently purchased by the Northern Grain & Warehouse Co. of Portland, will be increased to an output of 600 bbl. per day. The improvements will cost about \$75,000, and will include several new buildings and additional equipment.

The Columbia River Shipbuilding Co., Portland, plans to extend its docks and machine shop in the immediate future. New equipment will be added.

A. Stephenson, Hanford, Wash., is at the head of a syndicate that will erect a plant at White Bluffs, Wash., for the manufacture of cement pipe. It will be operated by electricity.

The Willamette Iron & Steel Works, Portland, has received a Government contract for 30 boilers, in addition to 24 previously contracted for. They will be installed in 18 steamers now under construction by the Willamette works and the Northwest Steel Co.

The Seattle Chain Works, Seattle, has applied to the county commissioners for an industrial site on the Duwamish River, on which it will erect a new plant.

The Elliott Bay Shipbuilding Co., Seattle, now constructing a wooden shipbuilding plant in that city at a cost of \$250,000, plans the expenditure of an additional \$500,000 in extensions. The plant has five ways and five more will be added. A machine shop equipped to build 1500 hp. steam engines and auxiliaries and a shop for manufacturing tanks will also be constructed.

The sawmill of the Copalis Lumber Co., Carlisle, Wash., was recently damaged by fire, with a loss of \$20,000. A large portion of the machinery was destroyed.

The Grant Smith-Porter-Guthrie Co., Portland, Ore., contemplates equipping a fitting-out dock, where machinery will be installed in vessels. In this connection a machine shop, 40 x 112 ft., will be built.

A machine shop, 300 x 400 ft., will be built at the Puget Sound Navy Yard at Bremerton, Wash.

Canada

TORONTO, Feb. 4.

The Canada Metal Co., Ltd., Fraser Avenue, Toronto, has been incorporated with a capital stock of \$1,000,000 by George H. Anderson, William G. Harris, Charles Swabey and others to manufacture forgings, alloys, etc.

The Monarch Tractors, Ltd., Toronto, has been incorporated with a capital stock of \$1,000,000 by Edward J. Swift, 69 Sherwood Avenue; Almer J. Gannon, Edith G. Gore and others, to manufacture farm tractors, machinery, implements, etc.

The Canadian Car & Foundry Co., Fort William, Ont., has closed a contract aggregating \$10,500,000, to build steel ships for the United States Government. A new plant 200x220 ft. marine railroad and slip will be constructed. The material for the ships has been arranged for with the Government and shipbuilding will commence in May. This contract will involve the employment of 1000 men in addition to the 1500 who will work on railroad contracts.

The Wentworth Orchard Co., Sun Life Building, Hamilton, Ont., is in the market for a 5-hp. electric motor.

The Canada Cycle & Motor Co., Ltd., Toronto, will increase its capital stock from \$50,000 to \$2,000,000.

The Nyando Pulp & Paper Corporation, incorporated under the laws of the State of Delaware, has been granted permission to manufacture pulp, paper, etc., in Ontario with a capital stock of \$1,000,000. William A. Dowler, Fort William, Ont., is the attorney.

The Thornton Rubber Co., Ltd., Oshawa, Ont., has been incorporated with a capital stock of \$50,000 by Joseph Thornton and Joseph W. Weldon, Westmount, Que., Spencer L. D. Harris, Montreal, and others to manufacture automobile tires and rubber goods.

Sessenwein Brothers, Ltd., Montreal, has been incorporated with a capital stock of \$35,000 by Peter Bercovitch, Ernest Lafontaine, Nathan Gordon and others to manufacture machinery, machine tools, etc.

The Pittsburg & Des Moines Steel Co., Inches Avenue, Chatham, Ont., has let contracts for rebuilding its plant recently destroyed by fire.

P. A. Beaulieu, Bienville, Que., will build a foundry at Levis, Que., to cost \$15,000. Joseph Blais, Mont Marie Street, has been given the contract.

Cap de la Madeleine, Que., will purchase a 30-hp., centrifugal pump, with 6 in. intake. J. Bourque is secretary.

A. S. Glingrich, Elmira, Ont., is in the market for a 30 to 35-hp. oil engine.

J. B. MacKenzie, Georgetown, Ont., is in the market for wood-working machinery.

E. Pullen, 20 Main Street, Toronto, Ont., is in the market for a 10 hp., d. c., 550 volt, high speed motor.

Port Colborne, Ont., will build a waterworks pumping plant and requires equipment. A. G. Ross is clerk.

The British Explosives, Ltd., Renfrew, Ont., will make repairs to its plant, recently damaged by fire, and will require 1/15 hp. and 1/2 hp. motors, etc. W. C. Cram is manager.

A. Langdon, Minden Point, Ont., is asking for prices on planers or matchers, combined.

The Sydney Rubber Roofing Co., Sydney, Vancouver, B. C., will build a plant to cost \$125,000. M. B. D. White is superintendent.

The Manitoba Steel & Iron Co., Ltd., Winnipeg, Man., has been incorporated with a capital stock of \$500,000 by Thomas R. Deacon, president of the Manitoba Bridge & Iron Works, Ltd.; Hugh B. Lyall, Robert D. Guy and others, to manufacture steel and iron, machinery, etc.

The British Columbia shipbuilding program is to be augmented by the construction of 40 wooden ships aggregating 140,000 tons. Twenty will be built in Victoria by a new company to be known as the Victoria Shipbuilding, Ltd., headed by J. G. Price, president Cameron Genoa Mills Shipbuilding, Ltd. The remainder will be built by the British American Shipbuilding & Engineering Co., Ltd., which has leased a site at Vancouver with J. A. Sears, Vancouver, B. C., at the head.

A. D. Peters, Claremont, Ont., is in the market for a 20 to 25-hp., stationary engine.

The Ernst Brothers Co., Ltd., Mount Forest, Ont., is in the market for two 10-hp., motors, 60-cycle, three-phase, 220 volts; complete with starter and no voltage release.

The Central Tools & Forgings Ltd., Winnipeg, has opened its plant for the manufacture of high-grade tools and forgings, such as chisels, punches, subsidiary tool steel lines, track tools, blacksmith supplies, etc.

Picton, Ont., will install a pump of 1000 gal. per min. capacity in its waterworks. P. C. Macnee is clerk.

The Canada Steel Goods Co., Ltd., Arthur Street, Hamilton, Ont., will build a four-story reinforced concrete factory to cost \$150,000. A. F. Hatch is manager.

The Redcliffe Rolling Mills, Ltd., Redcliffe, Alta., will rebuild its plant, destroyed by fire a short time ago, and will require machinery. G. Delane is in charge.

The roundhouse of the Canadian Northern Railway at Portage la Prairie, Man., was totally destroyed by fire with a loss of \$35,000. M. H. MacLeod, Winnipeg, is in charge.

J. W. English, chairman of the board of works, Brantford, Ont., is in the market for a motor for the sewage pumping station to cost \$2,500.

The R. H. Howes Construction Co., Boston and New York, are commencing shipbuilding operations in Nova Scotia, having leased the James Cosman shipyards at the mouth of the Meteghan River. Mills and pattern shops have been erected and operations begun.

The Schaafe Machine Co., Ltd., Granville Island, Vancouver, is building a machine shop, 65 x 160 ft., to be completed next spring.

The Wallace Foundry Co., Granville Island, Vancouver, recently completed its iron and brass foundry, erected chiefly to look after ship and machinery orders on the Pacific Coast. It has a ground area of 74 x 200 ft., exclusive of the pattern shop and offices, and is equipped to handle the largest marine castings. It has three casting pits, from 10 x 10 ft. to 16 x 16 ft., also three large coke ovens. Two cupolas, one three-ton and one five-ton are part of the equipment which handles the steel work. The plant is now working to capacity.

Ernst Brothers Co., Ltd., Mount Forest, Ont., are in the market for 15 or 20-hp. 220-volt, three-phase, sixty-cycle motors.

The Majestic Electric Supplies, Ltd., Toronto, has been incorporated with a capital stock of \$150,000 by Jacob H. Greenberg, 24 King Street West, and others.

Government Purchases

WASHINGTON, Feb. 4.

Bids will be received by the Bureau of Yards and Docks, Navy Department, Washington, until Feb. 25, under specifications 2775, for traveling cranes for the Washington Navy Yard, estimated to cost \$600,000.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, Jan. 28, for supplies for the navy yards, as follows:

Schedule 2850 1/2, Ordnance.

Class 61, Washington—Six vertical boring mills, motor driven—Bid 21, \$6,703.60; 128, \$9,255.

Schedule 2851 1/2, Ordnance.

Class 62, Washington—12 precision lathes—Bid 16, \$1,241.75; 25, \$1,275 and \$1,348.

Schedule 2831 1/2, Steam Engineering.

Class 71, Portsmouth—Steel shafting—Bid 51, \$12,800; 58, \$13,440; 107, \$24,223; 113, \$11,264.

Other bids were received on Jan. 29 as detailed below:

Schedule 1651, Ordnance.

Class 1, South Charleston—One motor-driven grinding machine—Bid 32, \$2,350; 35, \$709.50; 39, \$341, \$157.50, and \$246.75.

Class 2, South Charleston—One drill grinder—Bid 16, \$259.50; 23, \$352; 25, \$275; 32, \$585; 35, \$339.50.

Class 3, South Charleston—One motor-driven wet tool grinder—Bid 25, \$800 and \$840; 35, \$915.

The names of the bidders and the numbers under which they are designated in the above list are as follows: Bid 16, Kemp Machinery Co.; 21, Bullard Machine Tool Co.; 23, Manning, Maxwell & Moore, Inc.; 25, D. Nast Machinery Co.; 32, William Sellers & Co., Inc.; 35 [no name given]; 39, Ward & Co.; 51, Crucible Steel Co. of America; 58, Erie Forge Co.; 107, Midvale Steel & Ordnance Co.; 113, Mesta Machine Co.; 128, Niles-Bement-Pond Co.

NEW TRADE PUBLICATIONS

Quarter-Turn Cocks.—Homestead Valve Mfg. Co., Homestead, Pa. Folder. Relates to a quarter-turn type of plug cock for pipe lines which are seatless and are claimed to eliminate leakage. The different forms of cocks that can be supplied are illustrated and the construction is brought out by a sectional view.

Wire Nail Machines.—Sleeper and Hartley, Inc., Worcester, Mass. Bulletin No. 269. Gives general description and specifications for a line of wire nail machines in which rotating cams have been eliminated and toggle joints substituted. The advantages claimed for this arrangement are elimination of noise, rapidity of output and accessibility of the pointing and heading dies. A condensed table of specifications for the five sizes of machine which will make nails ranging from $\frac{3}{4}$ to 10 in. in length is included. An illustrated description of the machine appeared in THE IRON AGE, June 7, 1917.

Babbitt Metal.—Ajax Metal Co., Frankford and Richmond streets, Philadelphia. Circular. Devoted to the company's Bull babbitt metal. Emphasis is laid upon the importance of using exactly the same proportions of the different ingredients and the care that must be taken in pouring the alloy. The advantages of long life and cool running are pointed out in connection with the description of the way in which the metal is made.

Steel Plate Construction.—Treadwell Construction Co., Midland, Pa. Calendar. Size 18 $\frac{1}{4}$ x 24 $\frac{1}{4}$ in. In addition to the calendar for the month each leaf refers to the different forms of steel plate construction which the company is prepared to handle. Among these are stand pipes, blast furnaces, welded and riveted tanks, hot metal ladles, smokestacks, steel cylinders, drying and galvanizing pans, riveted steel pipe, etc. An illustration of some typical operation is presented in the upper half of each leaf. The dates for the month are printed in heavy figures and occupy the lower half of the leaf.

Electric Shrapnel Furnaces.—Electric Furnace Co., Alliance, Ohio. Pamphlet. Points out the advantages of using an automatic electric furnace for heat treating high explosive and shrapnel shells. In general the furnaces are the same as those which have been used for steel railroad and motor car parts and are designed to eliminate almost entirely the manual handling of the shells. Other points upon which emphasis is laid are the uniformity of the treatment, the saving of labor and the elimination of rejections. The operation of the furnaces is described at some length and the fact is supplemented by several engravings.

Engine Lathes.—Cincinnati Iron & Steel Co., Cincinnati. Circular. Illustrates and describes a 24-in. engine lathe for which the features of simple construction and ability to pull heavy cuts are claimed. In connection with the description, a number of views of different parts of the lathe are presented.

Electric Welding Apparatus.—Wilson Welder & Metals Co., Inc., Vanderbilt Ave. and Forty-fifth Street, New York. Catalog No. 2. Describes and illustrates the applications of the Wilson system of electric welding which enables any number of operators to work from one large machine without interfering with the work of each other and the different pieces of equipment required. In connection with the latter, brief specification tables and wiring diagrams supplement the text description and the illustrations. A number of views of work that has been done by the system are presented together with a number of tables of useful information.

Combination Precision Lathe and Grinding Machine.—Ideal Machine & Tool Co., 128 Opera Place, Cincinnati. Circular. Contains illustrations and a description of a combination precision lathe and grinding machine for handling practically all kinds of turning, internal and external boring and small slot and surface grinding. The machine is designed for use in the manufacture of electrical and scientific instruments, fine tools, punches, plug or snap gages, etc., and is provided with a universal table for milling or grinding flat or angular work. The construction is gone into at some length.

Tumbling Barrels and Sherardizing.—Globe Machine & Stamping Co., 1250 West Seventy-sixth Street, Cleveland. Two booklets. The first illustrates and describes different types of tumbling and burnishing barrels and gives information on some methods of using this equipment. The barrels covered include the various sizes of tilting and horizontal barrels with round or hexagonal bodies of either wood or steel. The illustrations and descriptive matter are supplemented in nearly every case by tables of the different sizes that can be supplied. The other booklet pertains to the sher-

ardizing process of rustproofing metal articles. The aim of the booklet is to present pertinent facts concerning the process and its effect on various materials in plain clear language which is free from technicalities.

Welding and Cutting Torch and Contractor's Acetylene Light.—Alexander Milburn Co., Baltimore. Two leaflets. The first pertains to a combination oxy-acetylene welding and cutting torch, a sample change of tips being all that is necessary to enable the torch to be used for either class of work. Uniformity of the flame with the elimination of flash-back and simple and readily accessible valves are among the features claimed for it. The other leaflet calls attention to a portable contractor's acetylene light that will give 1000 cp. for 12 hr. The construction of the light and the advantages of ease of setting up, brilliancy of illumination and ability to concentrate the light in any direction are briefly touched upon, the text being supplemented by numerous illustrations.

Firebrick Furnace Lining.—Betson Plastic Firebrick Co., Rome, N. Y. Folder. Mentions the way in which a one-piece lining for steam boiler furnaces can be made from a so-called plastic fire brick. The advantages claimed for the material include the elimination of the expansion and contraction due to changes in temperature and the ability to make the side wall lining and various arches as a solid monolithic structure without the use of moulds or special forms. A number of views of work that has been accomplished by the use of this material are included.

Grab Buckets.—Hayward Co., 50 Church Street, New York. Catalog No. 44. Illustrations and descriptive matter explain the operation and use of a line of grab buckets for industrial plant service. The three types upon which emphasis is laid are a two-line clamshell bucket for use on cranes or derricks having a double-drum hoist, an electric motor bucket in which there are no opening or closing lines and the jaws of the bucket are operated by an electric motor which is integral with the bucket itself and an automatic type for use with cranes or a monorail conveying system. In connection with the descriptions of the buckets, diagrams and views of installations are included to supplement the descriptive matter.

Drilling Machine Fixture.—Precision System, Mount Joy, Pa. Circular. Deals with a fixture employed in connection with boring and drilling holes in jigs, punches, dies, gages, master-plates, etc. The fixture which is designed for use on small vertical drilling machines eliminates the use of micrometers, and the adjustment of feed screws in addition to the accuracy obtained by the use of a set of standard gage blocks. The advantages of using this fixture are briefly presented and an illustration of it is included.

Triple Geared Engine Lathes.—David A. Wright, 569 Washington Boulevard, Chicago. Circular. Illustrations and descriptive matter call attention to a line of triple geared engine lathes that are built for ordinary shopwork or heavy duty manufacturing with swings ranging from 34 to 96 in. Illustrations of the different driving arrangements that can be supplied are presented together with a condensed table of specifications for the different sizes and patterns.

Steel Sheets and Tubing.—Youngstown Sheet & Tube Co., Youngstown, Ohio. Calendar. Presents illustrations in the upper half of the sheet of various stages in the manufacture of sheets and tubes from the unloading of the ore to the rolling mills. The lower half of the sheet is given over to the calendar for one month. With a view of reducing the consumption of paper stock only six leaves are used instead of 12, it being the intention to turn the sheets over instead of tearing them off and reversing the calendar at the end of the six months.

Silent Chain Drives and Conveying Machinery.—Link-Belt Co., Thirty-ninth Street and Stewart Avenue, Chicago. Calendar measuring 16 x 25 in. Gives illustrations of the silent chain drive and a number of its applications to various forms of power transmission as well as some of the elevating and conveying machinery that has been developed. These engravings and a list of the different products of the company occupy approximately one-half of the leaf, the remainder being given over to calendars of the preceding, present and succeeding months. The dates are printed in a fancy, but nevertheless easily read, face of type.

Power Hammer.—Alinder Hammer Co., 503 First National Bank Building, Milwaukee. Circular. Relates to a power hammer in which leather straps, rubber cushions, wooden arms, links, rollers, etc., have been eliminated and in which the ram comes down on the work with full force and remains until the full force of the blow has been spent in useful work. Among the advantages claimed for the hammer are universal application and control of the force and length of the stroke. A description and table of sizes are included, together with illustrations and a drawing in which the various features of construction and operation are emphasized by text matter, with leaders running to the part referred to.